JPRS-TND-86-009

23 APRIL 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-TND-86-009

23 APRIL 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

CONTENTS

LATIN AMERICA

INTER-AMERICAN AFFAIRS

ARGENTINA

BRAZIL

CHILE

NEAR EAST/SOUTH ASIA

INDIA

CANADA

AECL RESEARCH PROGRAM FOR NUCLEAR WASTE DISCUSSED

Toronto THE TORONTO STAR in English 13 Mar 86 p A5

[Article by Robert McDonald]

[Text]

LONDON — Canada is one of the countries Britain should look to in planning future radioactive-waste disposal, according to a new report that calls the Irish Sea the most radioactive stretch of water in the world.

Current U.K. nuclear waste practices are amateurish, haphazard and ad hoc, says the report released yesterday by the parliamentary Select Committee on the Environment.

It questioned the need for spent-fuel reprocessing carried out at such facilities as the British Nuclear Fuels plant at Sellafield in northwest England.

Discharges from Sellafield have caused radioactive contamination in fish found as far away as the Swedish coast, the report said.

Five accidents have been reported at Sellafield so far this year. In one, nearly half a tonne of uranium was accidentally dumped into the Irish Sea. In another, a radioactive mist escaped from the plant, contaminating 15 workers.

The report notes that Canada, the United States, Sweden and Germany, which have not opted for the reprocessing route, all have well-advanced research programs for the development of storage and disposal facilities for nuclear waste.

Atomic Energy Canada Ltd. (AECL) has carved out a giant research laboratory 285 metres underground at Lac du Bonnet, Man., to test the feasibility of using granite formations as spent-fuel repositories, the report says.

The AECL lab, which is scheduled for completion this year, will test what effect drilling the cavern has had on surrounding rocks and groundwater that might carry radioactivity back to the surface.

It will also be used for experiments on the effect of heat and pressure on fractured rock.

The AECL facility will be available for co-operative use by other countries, the report notes.

/9274
CSO: 5120/32

BULGARIA

KOZLODUY NUCLEAR PLANT CONSTRUCTION REPORTED

AU120828 Sofia BTA in English 0745 GMT 12 Mar 86

[Text] Sofia, March 12 (BTA)--The fifth generating unit of the first Bulgarian nuclear power station near the town of Kozloduy is under intensive construction. Forthcoming are the overall test of the process low diagrams and the test turning of the turbine with the steam from the operating capacities. Actually this would mark the beginning of the starting work which will leave to be completed this year.

The construction of a 1,000 MW reactor marked the beginning of a qualitatively new stage in the development of Bulgaria's nuclear power generation. These reactors have been considerably improved and meet higher technical requirements for seismic stability. Their construction has been industrialized with the introduction of new technologies. For these and for a number of other reasons the experience of the Soviet specialists of the Saporozhye and the Balakovo nuclear power stations who designed this generating unit, is of great importance. Let us recall that Bulgaria is the first country in the Balkans in which a 1,000 MW reactor is under construction.

A joint Bulgaro-Soviet group of specialists has been assigned the installation of the computer equipment. The fifth reactor will be fully automated. Polish and Vietnamese workers and specialists are also working on the site.

The sixth generating unit, which will also be of a 1,000 MW one, is under construction nearby. In 1988 half of the electricity generated in Bulgaria will be of nuclear origin.

/12858
CSO: 5100/3031

HUNGARY

ANALYSIS OF SAFEGUARD SYSTEMS OF VVER-440 REACTORS

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian Nos 10, 11, 12, 1985 pp 434-438

[Article by Sandor Czakoi, science assistant fellow, VEIKI [Planning and Engineering Enterprise of Electric Power Plants; Elod Hollo, science chief fellow, VEIKI; and Zoltan Kovacs, science fellow, VUPEK [expansion unknown; possibly the Czechoslovakian equivalent of VEIKI]: "Reliability Calculations of Nuclear Power Plant Systems, Analysis of the Safety Protection Systems of Type IV VVEER-.440 Reactors"]

[Excerpts] 1. Goal and Basic Concepts

Before the startup and during the operation of nuclear power plants the reliability of safety protection systems of the reactors is evaluated and analyzed also by numerical calculations. The results of the analyses are used to locate the weak points of the protection systems, optimize the maintenance and testing strategies, compare the reliabilities of systems with different structures, and evaluate the risks deriving from the operation of nuclear power plants.

We also designated these as goals when analyzing the safety protection systems of the V-213 and V-230 reactor types of the VVER-440 blocks. In the present article based on the calculations performed we compare the reliability of the different structures of first-degree safety protection systems (BV-1) of the two reactor types. In introduction we will define a few of the basic concepts of technology and calculation, then describe the structural differences of the two protection systems, and finally evaluate the results obtained. We used the CAT/PREP/KITT program system for the calculations, and published the descriptions of these in the first part of our article.

According to the recommendations of the International Electrotechnical Commission (IEC) the probability of faults developing in that portion of the BV system which performs the emergency shutdown by the reactor's parameters should not be greater than the 10^{-3} value from the viewpoint of a dangerous fault's development. In our case this value can be achieved in both BV-1 systems by correctly selecting the time intervals of evaluation. We will observe here that in determining the necessary time intervals of evaluation the controlling factor is the probability of a fault developing in the least reliable configuration. It can be seen from our results that in this respect at both BV-1 systems the two-parameter configuration must be used as the base.

In the case of the BV-1 system of the V-213 reactor 900 hours of evaluation time interval is necessary to achieve the 10^{-5} value of fault development probability--if we perform the previously recommended changes in the exit channel. If we do not, we must expect a 720-hour time interval between evaluations.

In the case of the V-230 reactor 80-hour evaluation time intervals are needed to observe the IEC recommendation, which is difficult to accomplish during the course of operation. If the recommended changes are made the evaluation time interval may be increased to 720 hours.

Table 1. Types of Elementary Faults and Their Effects on the System

Unit name	A. Type of Elementary Fault B. Effect on the Systems Dangerous fault development	Danger-free fault development	Fault development frequency x 10^6/hour
1. Relay, contacts of the magnetic switch	A. contacts stick together B. None	A. breakage, oxidation of contacts B. Yes	1
2. Relay, coils of the magnetic switch	A. -- B. None	A. Open circuit, short circuit B. Yes	1
3. Resistance	A. -- B. None	A. Open circuit B. Yes	1
4. Measurement channel	A. Dangerous B. Yes	A. Danger-free breakdown B. Yes	15.5
5. BR* block	A. Dangerous B. Yes	A. Danger-free breakdown B. Yes	1.3
6. Diode	A. -- B. None	A. short circuit B. Yes	1

*V-213 reactor type only

5. Summary

The following may be concluded on the basis of the results of the analyses performed:

--the configurations of the V-213 reactor type's BV-1 system are more reliable than those of the V-230 reactor type,

--we can improve the reliability of the BV-1 system of the V-230 reactor type by increasing the number of the measurement channels per parameter (from 3 to 6) and by doubling the exit relays of the logics channels. At the same time these changes will decrease the probabilities of breakdowns and lengthen the necessary evaluation time intervals,

--concerning the end channel of the BV-1 system of the V-213 reactor type, fault combinations consisting of two elements can occur which can be eliminated by removing the relays located in the end channel and thus the system's reliability can be significantly increased. The end channel of the V-230 reactor's BV-1 system is not among the "weak points" of safety protection.

8584/9365
CSO: 5100/3024

HUNGARY

DESCRIPTION OF WATER TREATMENT SYSTEM OF PAKS NUCLEAR POWER PLANT

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian Nos 10, 11, 12, 1985 pp 440-446

[Article by Peter Tilky (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise), Arpad Doma (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise), and Tamas Pinter (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise): "Description of the Water Treatment System of the Paks Nuclear Reactor"]

[Excerpts] Four type VVER[1]-440 nuclear power blocks will be built on the premises of the Paks Nuclear Power Plant. The blocks each have a performance of 440 MW, and light water is used to carry heat in their primary circuits as well as their moderator.[2]

Performance regulation of the reactors and control of the excess reactivity are accomplished with boron-steel regulator rods which can be placed in various positions in the active zone and by changing the concentration of boric acid solution dissolved in the heat carrier of the primary circuit, because the B atoms have good neutron adsorption characteristics. In the interest of the nuclear reactor's operating and radiation safety and of keeping the rate of corrosion of the structural materials to minimum and steady values, the heat carrier of the primary circuit must perform to the following strict standards.

In the secondary circuit a water function must be maintained which also satisfies the requirements of the large surfaces of the carbon-steel equipment and of the steam generating materials made of austenitic steel. Most suitable for this purpose is to purify the full main stream by condensation and combine it with feed water which is conditioned with 20-60 micrograms of hydrazine per kilogram of water.

1. Water Standards

1.1 Primary circuit water standards

a) H_3BO_3 concentration: 0-8 g/dm^3

--boric acid concentration of about 8 g/dm^3 after changeover, practically 0 before changeover

--12 g/dm^3 during the time of changeover of the active zone, and for reactors during shutdown.

b) pH: 6 in the interest of minimizing the rate of corrosion

c) K^+ concentration: 2-16.5 mg/dm^3

--the K^+ concentration is a function of the actual boric acid concentration,

--the pH-increasing effect of the small amount of Li^+ and Na^+ ions present in the primary circuit must also be taken into consideration in establishing the K^+ concentration.

d) Dissolved oxygen concentration: 0.01 mg/dm^3

--this value can be maintained by the thermal and chemical degasification of the makeup water and by holding down the radiolytic decomposition of the water in the primary circuit.

e) Dissolved hydrogen concentration: 30-60 Ncm^3/dm^3

--the dissolved H_2 decreases the equilibrium O concentration of the water's radiolysis.

f) NH_3 concentration: 5 mg/dm^3

--the necessary amount of H mentioned above comes from the radiolytic decomposition of the NH_3

g) Cl^- concentration: 0.1 mg/dm^3

--maintaining this parameter is designated to prevent the intercrystalline corrosion of the austenitic steels of the primary circuit

h) Calculating the corrosion products in terms of Fe equivalents:

1.2 Feed water standards of the Secondary Circuit

a)	conductivity:	0.3 micronS/cm
b)	pH:	7.5-8.5
c)	chloride ion concentration:	20 micrograms/dm^3
d)	silicates (SiO_3^{3-}):	25 micrograms/dm^3
e)	oxygen concentration:	10 micrograms/dm^3
f)	iron corrosion products:	20 micrograms/dm^3
g)	copper corrosion products:	3 micrograms/dm^3
h)	hydrazine concentration:	20-60 micrograms/dm^3

To purify the main condensate a condensate purification system was built for each turbine with chemical feed systems to accomplish the conditioning.

Summary

In their numbers as well as by their functions, the water treament systems of the Paks Nuclear Power Plant provide purification of the various aqueous media during the power plant's operation. They also contain adequate reserves for extraordinary situations. Through their coordinated manner of operation the nuclear power plant's radiation safety can be advantageously influenced, and corrosion damage of the structural materials can be held to a minimum level.

There are a number of possibilities to optimize the water treatment systems of the Paks Nuclear Power Plant mainly by refining their methods of operation. Extensive research and operational tests are underway to accomplish these. The goal of these is to achieve minimal waste production and the most favorable radiation conditions. In this respect the Paks Nuclear Power Plant occupies a good position in international comparison. It is our desire to publish in the near future the results achieved in this topic.

FOOTNOTES

1. VVER: water-water energetics and reactor.

2. Moderator: the medium serving to slow down fast neutrons to thermal neutrons.

8584/9365
CSO: 5100/3024

YUGOSLAVIA

JUSTIFICATION FOR NUCLEAR PLANT DEVELOPMENT QUESTIONED

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 8-10 Mar 86 p 2

[Article by Radmila Jovanovic: "Compromise Got Ahead of the Economy"]

[Text] As we come closer to April, when the international competition expires for construction and selection of the fuel cycle for four nuclear power plants each with a capacity of 1,000 megawatts in Yugoslavia, a public stirred up by the opposed opinions of the experts is increasingly restless. If we exclude fear, which gives everyone the right to say what he thinks regardless of arguments, then everything comes down to the point that nuclear power plants in Yugoslavia's very near future represent a compromise because of resistance to the economic valuation of domestic sources of energy, to their optimum consumption, and to a crash effort to develop what is available in order to repay the excessively heavy foreign debts as soon as possible and without the nuclear power plants. The sequence followed by adoption of the nuclear program is very symptomatic.

Decisions were being made concerning nuclear power plants in Yugoslavia back some three years ago when the Strategy for the Long-Range Development of the Fuel and Power Industry was deliberated and adopted as an integral part of the stabilization program. Nuclear power plants were included in the strategy as something inevitable for Yugoslavia, especially after the year 2000. Advertisement of the international invitation for bids on their construction and selection of the fuel cycle is only one of the steps which have followed after verification of the strategy by the highest sociopolitical and government bodies in the country.

Reserves of Coal - On the Rise!

The desire for a way out of the long lines of scarcity and inclusion in that Europe and that world which have not even given them a thought for a long period of time did not even let the voices opposed to the nuclear power plants get through. Nor did the conferences, seminars and series of lectures by specialists in which they talked about resources and capabilities of domestic conventional sources of energy and their advantages over nuclear power plants help until the invitation for bids was actually advertised. No, even

decisions of the Croatian Parliament and the Slovenian Parliament on construction and choice of a site for a new nuclear power plant, the second in the country, were able to arouse public opinion and the competent authorities.

Only now are we hearing from those whose professional and political duties put them in a position to read both the strategy and the stabilization program, and in fact they even participated in their adoption and enactment. Ordinary citizens are on the side of those who are concerned about their own existence and that of their progeny. All of this contributes to the argument that the nuclear program-- which in the way it was conceived can serve as a good example of how all technologically sensitive issues should be regulated in a uniform way for the entire country -- was deliberately enclosed in the wrapper of the Stabilization Program and the Strategy so that it would pass through more easily.

No one in the world, not even anyone in our country, has refuted the argument that nuclear power plants are a destiny which countries which have scant sources of energy will not be able to avoid. And that will be the case until some new universal form or source of renewable energy is found with a smaller potential hazard and uncertainty for future generations. The question is whether Yugoslavia is really among those with scant sources of energy and whether it should now and in this way catch what is supposed to be the last nuclear train.

Yugoslavia's resources of petroleum and uranium are scant, but not its water resources and known coal reserves. Those reserves are concentrated in Bosnia-Hercegovina and Serbia and are estimated at about 22 billion tons. The caloric value is between 1.887 in Kosovo and 3.037 in Bosnia-Hercegovina. For that reason it is not suitable for long-distance transport, which makes it indispensable that those who need the power generated from coal invest jointly to build facilities for it to be consumed within those republics. That is roughly the one side of the coin. The other lies in the fact that power has not been given an economic price, and its largest producers (who generate it from coal) sell it within the country at their own price, which is lower than the price at which it is consumed elsewhere.

It is not difficult for Croatia and Slovenia to reach agreement on the model of a joint investment to build the "Krsko" NE, to really refine that model and for the new nuclear power plant, and at present to do really everything to upgrade their electric power industries. Nevertheless they are up to their ears in losses, precisely because of those power plants. Still, in the country at large there is no uniform model of investment in joint power plants nor for the price of the electric power they generate. Yet there is enough coal for the production of power planned over at least the next 100 years. Its reserves are growing steadily thanks to exploration at newly discovered locations like the Cacak and Pester locations in Serbia.

With What Goods are the Nuclear Power Plants to be Paid For

The hydropower potential should also be borne in mind. But it turned out to be easier to agree on borrowing money jointly abroad and on repayment of debts denominated in foreign exchange which give employment and development to

the foreign partners than concerning the use and development of domestic forces.

One of the basic arguments of those who favor continuous building of nuclear power plants beginning at this very moment is that this is supposedly the last chance to jump on the nuclear train and become part of the technological revolution. The point is well taken that nuclear technology does raise the quality and upgrade all other technology and equip domestic industry for manufacturing to the highest standards, as it has been put by Dr Naim Afgan, professor in the School of Mechanical Engineering of Zagreb University, and Dr Milovan Studovic, docent for construction of nuclear reactors in the School of Electrical Engineering Belgrade University. Other specialists at the same level of knowledge and experience, like Dr Milorad Ristic, until recently professor of nuclear reactor construction at the School of Mechanical Engineering of Belgrade University, say that the Yugoslav machine building industry, which is disunited, is already too late for the nuclear program and that it has an opportunity to perfect itself and achieve supreme quality in other activities where it has more experience.

Yugoslav industry at one time mastered the production of thermal electric power plants with a capacity of 100 megawatts and was well on the way to equipping itself even for the largest ones. It has been five years or more now that the machine building industry in Croatia and Serbia has been unable to agree on the building of a factory to make boilers for coal-fired power plants with a capacity of 200 megawatts, while in Yugoslavia plants with a capacity of 600 megawatts are already being built on a large scale. The level of quality we want to achieve in nuclear technology, which is so sensitive, is also decisive to the construction of those plants. All interested parties know that those who possess nuclear technology are not about to allow anyone outside the blocs to get into the "fuel cycle." Put more simply, the vital equipment is kept secret, and the work that is given out is the conventional technology which is practically identical to that of thermal electric power plants.

Nuclear power plants have an advantage over thermal plants because they are clean, they consume less fuel, and they are built where the power is consumed and are not dependent upon location of the source of energy. As a rule the thermal electric power plants, especially when it comes to the quality of Yugoslav coal to fire them, have to be built at the pithead, and many people say that transmission of the electric power from them over long distances is expensive. This is to ignore the fact that construction of the network of a higher voltage would be gradual, that Yugoslav industry would be built up, as would most of those thermal electric power plants, and that the foreign exchange borrowed for all this would remain at home.

A single nuclear power plant with a capacity of 1,000 megawatts costs about two billion dollars (with interest) for advanced and stable economies. Drago Tomsic, M.A., an economist at the "Milan Vidmar" Electrical Institute in Ljubljana, says that importing a single facility from the convertible market and paid for with export goods costs at least two-and-a-half-fold more because of interest, rescheduling debts and low export prices. He calculated that to pay off a single project from the convertible market the workers in the West

have to work one year, while in our country they work about seven years because of interest, low productivity and the export prices on our goods!

No one has so far computed how much it would cost in foreign exchange to build four nuclear power plants in which domestic industry would participate nor what quantity of new goods and in what plants would have to be produced in order to pay them off. The present capacity and the unused potential it contains are not sufficient unless there is large-scale reorganization and restructuring even to pay off the debts we have contracted so far. So, the construction of nuclear power plants should not be looked at in the light of the potential hazard to the human environment either, but from the standpoint of economics. A seat might be taken in the nuclear train and we might be part of its schedule only somewhere around 1995 or perhaps some later year, when Yugoslavia will have more economic strength and there will be greater justification from the energy standpoint to build nuclear power plants, but they would be of considerably more recent technological date than those at present.

7045
CSO: 5100/3027

YUGOSLAVIA

ROUNDTABLE ON NUCLEAR POWER PLANT CONSTRUCTION

Zagreb VJESNIK in Serbo-Croatian 9, 16 Mar 86

[9 Mar 86 p 5]

[Interview with nuclear power specialists by Boris Petrovic and other VJESNIK staff writers, date and place not given]

[Text] Last week there were again quite a few reports from the outside world about certain bad experiences with nuclear power plants. Obviously, they no longer report on the sound operation of the other nuclear power plants. That is to some extent understandable from a journalist's viewpoint, since circulation wants fresh news. A similar line of thought led to reproaches of the news media these past days in a roundtable discussion devoted to our future energy situation, i.e., to the question of whether we are going to enter it with nuclear power construction projects or not, as well as reproaches of investors calling for them to provide additional and more complete information to the broadest public concerning their plans than they have up to now.

It was with the same aim that the editors of VJESNIK organized a roundtable discussion from which we published the first report last week, and now we are continuing it. To recall, the participants were Dr Naim Afgan, staff scientist in the "Boris Kidric" Nuclear Science Institute in Vinca; Dr Danilo Feretic, professor at the School of Electrical Engineering of Zagreb University; Ivan Medvedec and Dr Zeljko Pavlovic of the "Krsko" Nuclear Power Plant; Dr Djuro Miljanic, senior scientific associate of the "Rudjer Boskovic" Institute in Zagreb; Milan Novak, engineer and assistant chairman of the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades; and Zarko Petrovic, engineer and coordinator of the working group of the "Prevlaka" Nuclear Electric Power Plant in the Croatian Electric Power Community.

Whereas in our last issue we concerned ourselves with the possible causes of fear of nuclear power plants and explanations as to whether they are as necessary to us as is alleged, we are now publishing a part of the conversation concerning some of the consequences of their operation, our ability to take over nuclear technology, and the most recent world news in this area.

A Fateful, But Not Provocative Topic

VJESNIK: The fear of radiation is often in first place among the numerous reasons why such power plants, as their opponents say, should be eliminated.

Danilo Feretic: As far as the impact on the environment goes, at the present time it is generally accepted that nuclear power plants are a better solution than conventional thermal electric power plants, for instance those fired with coal. I would also add that at the upcoming conference being organized by the International Agency for Atomic Energy one of the topics discussed will be construction of nuclear power plants on behalf of environmental protection! But regardless of this topic, which until recently was quite provocative, it is enough to compare the environment of the "Krsko" NE with the environment of any thermal electric power plant.

As for the fear of radiation, I would recall the datum that the annual radiation dose of a person living in the immediate vicinity of a nuclear power plant is less than 3 millirems. Every year a man is irradiated with a dose of about 10 millirems from looking at color television. There are several other comparisons that might be referred to, but I think that that is enough said. It is also a fact that the 38 reactor years of operation of nuclear power plants in the world have not as far as we know resulted in a single breakdown in a nuclear plant that would have resulted in a case of death. There is hardly any branch of the energy industry that can boast of such a figure, not to mention the accidents in mines.

When the discussion turns to the safety of nuclear power plants, mention is immediately made of the well-known incident recorded in 1979 at the Three-Mile-Island Nuclear Power Plant. That is the largest incident that has occurred so far in any such power plant, but still even the individual who was irradiated most intensely received a dose less than that from a single X-ray.

VJESNIK: Safety also depends on making proper repairs, on maintenance, on the training of personnel....

Ivan Medvedec: In the repairs done so far there have been three or four foreign experts participating. We are doing everything with our own resources, but the job is done in conformity with the strictest standards.

Zeljko Pavlovic: The personnel employed at the "Krsko" NE were especially trained for their job, and there is a constant practice of "retraining" through which all specialists go even though they have masters' degrees, doctors' degrees, and so on. I might also enumerate many other measures which reduce the risk because of the "human factor" to the level which is customary in the world, that is, a very low level.

Djuro Miljanic: The International Atomic Agency in Vienna, which has an important role in assisting countries with nuclear power plants to adopt appropriate legal regulations, also organizes what are called safety missions, visits to nuclear power plants, and in so doing it gives its opinion on the condition of the facility, the level of training and performance of personnel, and so on. So far it has been satisfied with what it saw at Krsko.

Zeljko Pavlovic: We have been given higher grades than the average recorded at other nuclear power plants. I would also add that four- to fivefold more specialists with higher education are employed at the "Krsko" NE than at

similar facilities in other countries. Incidentally, a special "hot line" with direct connection to Westinghouse has even been installed in case of a trouble we could not solve ourselves.

VJESNIK: Has it been used yet?

Zeljko Pavlovic: Only during the drill which included all procedures in case of a serious accident.

VJESNIK: Which means that this is also taken into account. Otherwise why would there be drills?...

Naim Afgan: You are familiar with Murphy's law, which states: "If something can happen, then it will happen."

VJESNIK: We also know the extension of it: If it did in fact happen, there was always someone who knew that it would happen!

Naim Afgan: Well, let us say quite seriously that regardless of whether any such large accident has ever been recorded, preparations should be made for every possibility. But great concern should be paid to safety even in the stages of design and construction. You know, nuclear technology was unable to indulge in the luxury of operating on the principle of trial and error like numerous other industries. That is why a multiple barrier is set up between the radioactive substances and the outside world and why there are other automatic safety devices.

Danilo Feretic: I would also add something about the radiation many people are so afraid of. After all, we hear things like this: If, say, the permissible dose in some case is less than 150 millirems, what will happen if a person receives 151 millirems? Will he suffer? In general, the question of radiation is not well known, and a lot of time and newspaper space should be devoted to clarifying matters. And to show that matters are not really so serious as some people say, in addition to the figures which I have already given, I will add that it is less well known that inhabitants of parts of Slovenia, for example, Jesenice or Kranjska Gora, receive approximately 100 millirems a year more than inhabitants of the Sava Valley. Dare we immediately conclude on that basis that that region is unhealthy?

VJESNIK: How capable are we of adopting an entire series of nuclear power plants?

Danilo Feretic: Over the period of time since we were starting out with the "Krsko" NE there has been quite a bit of change for the better. We know quite a bit more than we did, we are more expert in evaluating technology, some 40 nuclear engineers have completed their studies, and their advanced technical training is still continuing. We should also mention the competence of republic inspectors and other related agencies.

VJESNIK: The "nuclear people" are attacked for building yet another power plant on an unregulated river.

Ivan Medvedec: My answer to that is that during a low-level flight over the Tennessee River I saw that it has not been regulated over its entire course, and still several nuclear power plants have sprung up on its banks. The two which I visited had capacities of 3,900 and 2,600 megawatts. So, they are many times more powerful than the "Krsko" NE, but still they are cooled with water from an "unregulated" river.

VJESNIK: There are obviously a host of opinions or at least assertions and assumptions which should be taken into account and reconciled with one another, and that also applies to the question of the degree of regulation of a stream where a nuclear power plant has been built. However, there is one thing that all nevertheless agree on, at least as far as our country is concerned: the power from the nuclear power plant is too expensive when all the construction costs, the interest, and so on, are added together.

Ivan Medvedec: Depending on the version of the computation; that is, with capital formation or reduction to zero [?] we will get a price per kilowatt-hour generated which at the very least will be competitive with other power plants.

Danilo Feretic: According to the most recent figures, and I will refer to only three examples, the electric power obtained from nuclear plants actually turns out to be appreciably cheaper than what is obtained from conventional thermal electric power plants. In France, if we take the power from thermal power plants fired with liquid fuels as 100, power plants which use coal (together with the device to remove the sulfur) produce it at a price index of 46, thermal power plants without removal of the sulfur at 42, and nuclear power plants at 31 percent of the price per kilowatt-hour from the "oil-fired power plant." In Belgium electric power coming from the "Chooz B" NE costs 52 percent of the price of power from the oil-fired thermal electric power plant, and so on. In Japan the price is even compared to that of hydropower. If the price from a hydroplant is taken at 100 percent, then power from a coal plant costs 75 percent and that from a nuclear power plant 60 percent. Those are all prices whose absolute level needs special comment concerning the specific energy conditions of each country.

VJESNIK: What kind of nuclear power plant do you think the electric power industry will decide on? The most recent model or that which has so far been operating satisfactorily the longest?

Danilo Feretic: In such matters the electric power industry pretty much tends to play it safe, and that also applies to choosing equipment for a conventional power plant. The features usually accepted for nuclear power plants are those which certainly offer the most good experience. Unfortunately, the development of technology is sometimes faster than analysis of experiences that would help to make a decision. That is why the trend in the world today is toward standardization of certain components of nuclear power plants and at the same time toward construction of power plants with smaller capacity, i.e., some 500-600 megawatts. The trend is toward buying the smallest and most standard model. If you want the most recent model, pull out your wallet and pay for something that might turn out to be nothing more than an experiment.

VJESNIK: What is the news in the field of nuclear power plants which has not been recorded by the domestic news media?

Djuro Miljanovic: Among the items which have not been published in our country and are mainly known to the restricted group of specialists I would single out the following. In December 1985 the prime ministers of the member countries of CEMA agreed on a joint comprehensive program for development along the five most important directions, among them nuclear power. Their main aims in that area are to perfect and continue construction of power plants with light-water reactors, improvement in the handling of radioactive waste and its disposal, development of combined nuclear power plants and heating plants, and the development and construction of fast-breeder reactors and research on controlled fusion.

South Korea has invited bids for construction of its 11th and 12th nuclear power plants, in India a proposal has been made to build another 14 in addition to the 6 they have now, and construction is supposed to begin before 1990. Incidentally, in January the "Superphoenix," the most powerful fast-breeder reactor in the world (1,200 megawatts), went on line in France, and it is anticipated that in the decades immediately ahead power plants with those reactors will have an important role in the electric power industry.

Dr Josip Cicek: Nothing Gets Built With Labels

So far the greatest contribution to organized resolution of the hesitation about building nuclear power plants has been made by the Section of the Croation Republic Conference of the SAWP for Environmental Protection and Improvement and its chairman, Dr Josip Cicek, hardly needs a special introduction. That is why we will skip the usual introductions and move on to the questions we had hoped to put to him at our roundtable discussion, which unfortunately he was unable to attend.

[Question] Right at the beginning we are interested in knowing whether as an individual and a physician you are an opponent of nuclear power plants?

[Answer] I am not an opponent of nuclear technology and nuclear power plants. I am aware that medicine--if one talks only about ionizing radiation--puts a considerably higher burden of all sorts of radiation on modern man with its diagnostic and therapeutic methods than do nuclear power plants. As an individual and on the basis of everything I have seen in 11 countries where there are nuclear power plants and conversations with specialists in the nuclear and health fields, I can say that nuclear power plants do not represent a danger in an organized society and in normal operation.

Of course, I put my questions on all matters primarily as a physician and as a person concerned with the problems of environmental protection. But precisely for that reason I say that society must be organized in an almost militant way in order to prevent possible dangers and for effective protection of the environment. We need a high level of techological awareness and sophistication as well as ecological awareness. Otherwise, nuclear power plants represent a great potential danger.

In view of the location of the present nuclear power plants, the long-term consequences of their operation, and also the kind of "consequences" that have already been recorded in the world, our low level of organization, and above all the catastrophic situation in the practical matter of environmental protection, I must admit that I am deeply disturbed. In spite of all the reports about incidents, I say that actually little is known about all this. For example, it is not very well known that beyond the Urals there is an area, approximately half as large as Yugoslavia, "surrounded by barbed wire" for the next 24,600 years, and all of this because of nuclear troubles. I am also worried because we have more than 300 laws, regulations, and so on, pertaining to environmental protection, but presumably there is no need to spell out what actual performance has been. And something else. We have actually been systematic in failing to resolve the question of financing environmental protection.

Four Years of "Pruning"

[Question] As chairman of the section for environmental protection, you say that in the section you have not attacked the nuclear program?

[Answer] We have. Both as a section and as individuals responsible for being concerned in an organized way about protection of the environment. But not out of any sort of "emotions" as we have been accused of, but because of the bad experiences there have been so far in the application of that technology. It has to be said openly and honestly that at the time when our first nuclear power plant was under construction we did not have any legislation at all in this area, and the builders had to "push" the administrative agencies to adopt appropriate laws and thus put in place the conditions for construction and operation of the "Krsko" NE. Isn't this indication enough of our situation? Quite a bit has been done so far, but is all of that sufficient for us to be reflecting even about a series of nuclear power plants?

[Question] Every month your section receives a report on the operation of the "Krsko" NE, and its general conclusion has been that it is operating well.

[Answer] Very good results have indeed been achieved in these 4 years, but the state of concern still persists. I will mention just one example, and that is the problem of monitoring, that is, of monitoring the impact of the nuclear power plant on the environment. Monitoring is actually one of the essential conditions for the "operating permit" of a nuclear power plant. Under republic and federal legislation the monitoring must be provided and done by the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades. The scope of that monitoring has been "pruned" for 4 years now, and there has been a tug-of-war over extending the contract on conducting it. When the nuclear power plant "felt" a certain insecurity, a decision was made by the bodies of management not to pay any longer for that portion of monitoring which pertains to nonradiological emissions. Then there were interventions, and everything somehow quieted down. And now we have a unilateral decision by the chairman of that committee that they no longer have to pay for that. The legislation provides otherwise. Unless we manage to peacefully agree on a resolution to that dispute, we must as citizens institute judicial proceedings against the committee and its chairman!

[Question] Have there been other objections as well?

[Answer] There have been things which simply horrify me as an ordinary citizen and as a member of the section! I might read a long list, but I will single out one example. At first the nuclear power plant was supposed to emit into the Sava radionuclides with a value of 1 curie, and then the limit was moved up to 2....

[Question] Is that already hazardous?

[Answer] That is not the point. Ultimately even 10 curies is not hazardous, but it is well known that the radiological capacity of the Sava is 10 curies, so that at the upper limit that was fixed in the first version on the river there would be, as it were, "room" for 10 nuclear power plants. If we go on this way, the "Krsko" NE will take up the entire allowed capacity of the Sava for the discharge of radionuclides. What right do we have to do that? We will be asked questions about this by the other republics through which the Sava flows and with good reason, and coming generations will have to reflect on this, if they intend at all to build new nuclear power plants.

Why Is There Such Division?

[Question] What about the heat pollution, which was why the nuclear power plant had to operate at less than capacity or even stand idle when there was the greatest power shortage because of the drought? Does all this mean that reports on the operation or, better put, the consequences of operation of the "Krsko" NE have not really been so splendid as some people assert?

[Answer] At the moment the nuclear power plant is safe, just as it is said to be. But it cannot meet the idealized and high engineering and technological requirements which were announced at the outset. Are those conditions too strict by comparison with world practice? I think not, and I emphasize that guarantees were even offered that all the operating conditions established would be met. There have also been departures from the limits once established in the area of thermal pollution. Back in 1974, when our section and the Yugoslav Council for Environmental Protection organized the first public discussion of these topics in Zagreb, representatives of the electric power industry even laughed at our doubts about excessive heating up of the Sava! They said that the nuclear power plant would not raise the temperature more than 2° Celsius, but we now know that there have been cases when the Sava was heated up even more than 6° Celsius above what can be stated most simply as the normal.

It should also be said that this did not cause harmful consequences, since the heating up took place in the wintertime, but all of this is evidence that the promised limits on the nuclear power plant's environmental impact are gradually being exceeded.

[Question] Nevertheless, tell us why you and the section have somehow attacked construction of nuclear power plants?

[Answer] There are several reasons. Throughout the world nuclear power plants are mainly grouped at one place, i.e., several such power generating units are built on the same site, which has been verified. We obviously intend to scatter them over all of Yugoslavia, however it suits the individual power industry [that is, of the republics] or guided by individual and local interests. I think that a nuclear program cannot support that kind of behavior, and I have every reason to support that assertion from experience in the rest of the world. I will also add that the nuclear program we are talking about has in practice very few features of a national program, although the opposite is asserted.

The second of our numerous objections has to do with the fact that other solutions were not even offered for overcoming the energy crisis. They told us: either nuclear technology or darkness and disaster. It is especially disturbing that all the documents announce industrial development, the training of personnel, benefit to all of associated labor, and the like, but I have never seen mention anywhere of development of scientific institutions that would be concerned with the ecological aspect of applying that technology. That is how it is done everywhere in the world. That is probably how it will also be done in our country, but then at the expense of the entire society, not the "nuclear power people." That is intolerable, and all of those related activities ought to be developed and paid for by the investors in the nuclear program. I would also add that nowhere do the plans mention the additional infrastructure: for example, not even the special roads for carrying everything related to nuclear power plants. Is the fuel or the highly radioactive waste to be carried on the Zagreb--Rijeka highway in the middle of the tourist season?

Nothing Without a Dialogue

[Question] At the frequent meetings where there has been discussion of the future energy situation and nuclear power plants there have been quite a few serious reproaches of the electric power industry. They usually have to do with being late and incomplete in informing the public.

[Answer] For my part I reproach them for not having taken pains, for not having required their specialists to provide information on all the details that argue for or against nuclear power plants. There should be more complete and timely information provided on all aspects even to the so-called opponents of nuclear technology, and an open dialogue should be initiated.... In Sweden 5 years before the decision was made on such power plants the funds were provided for operation of numerous specialized institutions which prepared pamphlets and materials on nuclear technology. They were free to every citizen who wanted them. That generated a great deal of material in which completely opposing views were frequently argued, but every occasion was offered to learn as much as possible about this important area and the problems in it and to arrive at one's own position. The opportunity for choice was offered, and confidence in the specialists was preserved. And when a referendum was organized, it was possible to take a position after 5 years of discussion and hundreds of debates on radio and television....

An example of how the investor should behave can also be found in another country. France gave a great deal of reflection to preparing the broadest public for carrying out the nuclear program, and in Denmark, where it was not adopted, a nuclear package was offered to parliament in a first version, but without offering other solutions. The package was returned to sender. The investors were simply told that they should also propose other solutions, and then a decision would be made of what would be more favorable for the country in terms of energy and finance in view of its specific situation. Denmark also has extremely scant sources of energy of its own, but still it rejected the nuclear program. Advocates of alternative solutions proposed by the universities in Aarhus and Copenhagen and reliance on conventional power plants prevailed even though Denmark does not have large coal reserves or hydropower. And astounding results have been achieved using bioenergy, that is, by obtaining biogas and electric power from that source. I will only mention that I myself have had an opportunity to see how every farmer who has 200 cows produces enough gas to meet his own needs, sell the surplus to the government, or use it to produce electric power which he also sells! And Denmark, let us recall, is a country with a very high per capita electric power consumption.

Regardless of what the final decision would be, even before construction of the "Krsko" NE the broadest public should have been made familiar with all the details related to construction of nuclear power plants or any other power facility. Back in 1979 I prepared a publication on what science knows about the accompanying consequences of producing any type of energy. So far I have not found a publisher, although I offered the material and renounced any payment for it whatsoever. A book of that kind containing the most important data on nuclear power plants was exceedingly necessary, and proposals for publishing one were made even in the series of lectures recently devoted to this topic.

Put Simply: Protectors of the Environment

[Question] You and people who think like you are referred to as "green."...

[Answer] Up until the well-known statement in the LCY Central Committee I was exceedingly dissatisfied with the articles our newspapers published in which they wrote uncritically about nuclear technology and forgot about the ecological aspect, and when I began to publish a pamphlet which called attention to that side of the coin as well it was all of a sudden broken off, supposedly because of some intervention "from above."

When articles began to be published which did not support nuclear power plants then there began to be that kind of name-calling. We do not consider ourselves either "green" or "ecologists" at all, but simply protectors of the environment. But now I am considerably better satisfied about the work of the news media, since an occasion has finally been offered for what we might refer to as both sides expressing their opinion. It is just that all of that began with a lag of at least 5 or 6 years.

I would add that in our self-managed society everyone must be in favor of development, but also in favor of protection of the environment in which they themselves live and which they are leaving as an inheritance to future generations. In that context, and I in fact propose this as one of the topics for

VJESNIK's articles on nuclear power plants, there ought to be more serious concern with the question of storing nuclear waste and the reasons why several sociopolitical communities have already refused to have such waste disposal sites on their territory.

[16 Mar 86 p 6]

[Interview with specialists in nuclear technology by Damir Mikulicic and Boris Petrovic: "Nuclear Power Plants Under the Magnifying Glass"; date and place not given]

[Text] Hardly a day goes by in which there is no news from the outside world in the field of nuclear energy, and these new items (mainly bad for the "nukists") have been especially frequent since the prices of oil have been dropping. At the same time, as the deadline approaches for bids on construction of the nuclear power plants in our country, there have been more and more public statements by individuals opposing the use of nuclear power, the nuclear power plants have aroused vigorous exchanges in meetings, and the general public has been mostly confused. After all, many people rightly ask: Wasn't everything being said now known even earlier, even before construction of our first nuclear plant at Krsko?

Do we need nuclear power plants at all, or do there exist other less expensive and "less hazardous" solutions; why is there suddenly this virtual flood of distrust, who is it that is frightening us with the bugbear of radiation, and why; are nuclear power plants really as unreliable as some people assert?

These were also some of the questions taken up in the roundtable discussion organized by NEDELJNI VJESNIK; on this occasion the participants in the discussion were Dr Naim Afgan, scientific adviser in the "Boris Kidric" Institute for Nuclear Science at Vinca; Dr Danilo Feretic, professor in the School of Electrical Engineering at Zagreb University; Ivan Medvedec and Dr Zeljko Pavlovic of the "Krsko" Nuclear Power Plant; Dr Djuro Miljanic, senior scientific adviser at the "Rudjer Boskovic" Institute in Zagreb; Milan Novak, engineer and vice chairman of the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades; and Zarko Petrovic, engineer and coordinator of the working group for the "Prevlaka" Nuclear Electric Power Plant in the Croatian Electric Power Community.

Let us immediately add that the number of those who wanted to talk about this "hot" topic was considerably greater at the outset, but some withdrew at the last moment. Was the topic too hot?

Right at the outset we wanted to hear the opinion of our interviewees about why all of a sudden there is such a hue and cry in our country about nuclear power plants, why so much "fear" and lack of confidence in the professional competence of our scientists to evaluate whether we need nuclear power plants or not?

VJESNIK: What are the causes of this sudden fear, and has the rest of the world also become afraid of the nuclear power plants it has been living with for some 30 years?

Naim Afgan: It seems that we did not sufficiently take into account the "factor of the public." That should be said straight out. Concerned with our everyday affairs and the desire to obtain scientific results as soon as possible, we forgot about informing the broadest citizenry. Now others have entered that vacuum, and I agree with the opinion that the best conclusion can be drawn concerning the causes of the "fear" if we draw up a list of the people who are spreading it and analyze what it is that these people do for a living. Nevertheless, it is we professionals who are the most to blame for the disposition against nuclear power plants that has now been aroused.

Who is afraid of nuclear power plants, or at least who is coming out against them? I would say that there are roughly three groups of people: Most of those who are "frightened" do not have enough education, and their fear of the unknown is easy to understand. Incidentally, the same thing has happened in the rest of the world. Some sociologists compare this to the reactions and fears that prevail in certain primitive tribes. For example, certain tribes in Zaire have a panicky fear of lightning, sterility, and bronchitis. Why precisely those among all the other dangers? There is no rational explanation. The same sociologists say that in modern civilization people are most afraid of war, poverty, and unrest, but also of nuclear energy. Again there is no rational explanation as to why alongside the numerous other equally great dangers which potentially threaten us in everyday life.

I would put in the second group some of those who are professionals in related activities and want to extend their competence to nuclear energy as well. That is how very-well-known and prestigious names resound in the public; the ordinary man does not doubt their opinion at all, since he does not know that they are ignorant and incompetent when it comes to nuclear energy.

And finally, I would put in the third group those whose ultimate goals at this moment are not altogether clear, but they are skillfully taking advantage of the space left open to them. Among them there are even dissident groups, and it is strange that there have not been more severe reactions to the statements made by such individuals and groups. I feel that neither the electric power industry, nor the industrial sector, nor science have turned sufficiently toward the public. Had that not been the case, what you asked about would not have happened.

Danilo Feretic: I would say that there are only two groups: In one, the general populace which is not well enough informed, and in the other, those who have been attempting to manipulate it.

The work on the nuclear program in Yugoslavia actually began some 30 years ago, work has been going on in Vinca, Ljubljana, and elsewhere, and there has been no reaction whatsoever. But when the question was raised of the competitiveness of nuclear power with other sources of energy, a storm was raised. That also happened in the United States in the seventies when the coal and oil producers sounded the alarm. Fear of the unknown or the insufficiently known has been skillfully used everywhere for certain goals. I wonder why all of a sudden the "Braca Ribar" Local Community has gotten into an uproar or, still better, who is it that "informed" them about the harmfulness of nuclear power and problems in that area?

There has also been a lot of manipulation with the fear of new borrowing abroad. Mention is made of the "horrifying" billions, and I wonder where those figures were taken from? Perhaps the real motive behind such statements is the fear that nuclear power will "eat up" all the money, and there will not be enough for other investment projects. Yet there has been the greatest manipulation in connection with ecology. We all know that even electricity is hazardous, but no one is afraid of a battery or an ordinary transistor radio. Intense radiation is also hazardous, but the radiation caused by a nuclear power plant is considerably less than is thought. The difference between a dangerous dose and the one from a nuclear power plant is even greater than the gap between the danger of high tension and the radio battery.

VJESNIK: We have to add that all of this pertains to a time in which the nuclear power plant is operating without any sort of major difficulties and also that there are differing opinions about this. While the discussions are still going on, it would also be worthwhile to say something about whether anything has changed in our nuclear plans in view of so much doubt or even protest?

Ivan Medvedec: I think that we should emphasize that not a single of the official decisions about carrying out the Yugoslav nuclear program has changed. I am referring here above all to the decisions of the SFRY State Presidency dating from 1977 and 1985 which place an obligation to all sociopolitical and economic structures in the country to equip themselves for construction of nuclear power plants in the country and abroad, in other words, for the complete transfer of the technology. The Yugoslav electric power industry has done four studies in which they work up the country's power needs up to the year 2000, domestic energy resources, the capabilities of the Yugoslav machinebuilding industry and the industry which makes power engineering equipment, and the international aspects of the use of atomic energy for peaceful purposes. Thus the assessment is that by the year 2010 we should build all of 25,000 megawatts of capacity in nuclear power plants, and 12,000 megawatts by no later than the year 2000. In view of the objective capabilities for construction, the nuclear program has for the present, as is well known, been reduced to four nuclear power plants each with a capacity of 1,000 megawatts.

However, it should be said that the decisionmaking on this matter went through social compacts and self-management accords which were signed by all the republics and provinces and all those involved, which means the electric power industry, the industrial sector.... Last year an agreement was signed in Novi Sad to invite bids on four nuclear power plants, and it was decided that the electric power industry would help to cover the costs of that tender. In short, complete legality of decisionmaking was guaranteed, and all the necessary documents have been published in the appropriate official gazette. That is, they were accessible to the public.

Since I work at the "Krsko" NE, I would add that our first nuclear power plant is completely open to the public, and the purpose is precisely in order to demystify nuclear technology. There is not a single citizen or institution whom we have not informed about everything they were interested in concerning the operation of the "Krsko" NE if they only showed the desire.

VJESNIK: Tell us briefly what has been the experience with our nuclear power plant so far.

Ivan Medvedec: The power plant has been in operation 3.5 years, so far it has generated about 15 billion kilowatt-hours without a single incident concerning the personnel working in it.

As for actions against similar projects, which have recently been frequent in the press and on television, I say that the people who participate in them are far from the problems involved in carrying out a nuclear program. I am thinking here of their professional background and what they do every day, and all those actions also have political overtones. I think that the policymakers ought to be concerned with this and something done through the Socialist Alliance and the League of Communists. It is strange that people should make an appearance here like Dimov, Kulic, Ivanovic, and others. You have Kulic, take Kulic, who presents himself as head of the Center for Strategic Research, and even says that radioactive waste is not buried or stored, but concealed.

VJESNIK: Along with the note that we have already announced that Slavko Kulic will come to talk about his view of nuclear power plants, you will have to admit that in the end it seems more and more that the press is "principally to blame" for the wave of indisposition toward nuclear power plants.

Naim Afgan: When we discuss nuclear power and our society, we have to find a way of explaining things to people who have been brought to the verge of fear and frustration. Here the news media ought to play a different role. Our press dare not take the position that the only good news is bad news. The papers which I read are full of precisely that kind of news, and for a long time now not a single good piece of news pertaining to nuclear power has been carried over from scientific journals in the world. I could list at least a dozen prestigious journals published in the world which have never been quoted. So, a certain climate is being created....

VJESNIK: Let us get back to the nuclear power plants themselves. How much truth is there in certain assertions that even without them we could go into the next century if we make full use of our own sources of energy?

Zarko Petrovic: All of a sudden it is being argued that we have an abundance of hydropower and coal and why should we be pushed into adopting expensive and dangerous imported technology when we have enough safe conventional sources? I have brought a whole heap of documents which prove the opposite, and as far as SR Croatia is concerned, I would recall that in 1978 we drafted and revised the master energy balance of the electric power industry in the republic and that those documents went through all the authoritative forums. All of that has now been supplemented by a new study which took into account the trouble with foreign exchange, and we especially concerned ourselves with seeking the pattern of the most favorable sources of energy. A complete inventory was made of energy resources in the republic, the computers process some 500-600 possible combinations, and we finally arrived at the best possible pattern of energy sources under present conditions. That is how we arrived at the program which states what should be built in what order, and it says that we have

to make use of hydropower, power plants with pumped storage, coal-fired thermal electric power plants, converted oil-fired plants, and only at the end, as an additional segment, is nuclear power to be found. A plan was drawn up for development of the electric power industry over the period from 1986 to 1990, and it was put up for public discussion.

VJESNIK: Does this mean that no alternative energy program of the republic or Yugoslavia was drawn up or at least an attempt made to draw one up without nuclear power, a program in which not only would full use be made of domestic resources, but it would also call for more optimum use of energy and conservation?

Zarko Petrovic: Some 20 such versions were drawn up in order first of all to use all the hydropower and then not to build nuclear power plants, but coal-fired thermal plants. And it turned out that somewhere around the year 2010 we would not have a single kilogram of coal left!

Milan Novak: The SFRY State Presidency has twice committed itself to the nuclear program after analyzing energy resources and the strategy for overall development. It did not commit itself to deadlines, since these are completely technical matters, and also consumption is changing in view of society's development and general economic conditions. I would recall that carrying out the nuclear program will take at least 10 or indeed even 15 years, and that we dare not miss that train. As for SR Croatia, it is well known that the energy resources of our republic are approximately threefold scantier than the Yugoslav average, and the primary energy our country possesses is one-sixth of the world average. Simple arithmetic shows that Croatia's energy resources are one-eighteenth of the world average.

Zarko Petrovic: Doesn't all this show that we cannot go into the next century without nuclear power? The alternative is between a nuclear power plant and cutbacks on the use of electric power.

Milan Novak: Some countries are turning toward imported electric power, and since power from nuclear power plants represents an ever greater percentage of world production, we would undoubtedly be importing "atomic power" however much some people would like to persuade us that this is not so. I would therefore say that when it comes to energy strategy, the alternative is not only darkness, but also ever greater dependence upon imports.

It is envisaged in SR Croatia that electric power consumption will increase at an annual rate of 4.5 percent up to the year 1995 and later even at a rate of 6 percent. Assuming, of course, that we actually have that power. Incidentally, there has also been a great deal of manipulation with these forecasts of the growth of consumption. At the present level of power consumption in Yugoslavia we are the third in Europe, but at the bottom of the ladder! Every place up from the bottom also means a large growth of consumption. The envisaged growth, and I take responsibility for this assertion, is not large at all, especially if we want to achieve a growth of the social product between 2.5 and 3 percent.

Let me immediately clear up another frequent error in reflections about consumption of electricity. The percentage of consumption of electric power must be higher than the growth of the social product, but the consumption of primary energy must increase by a smaller percentage. After all, as the standard of living and the country's economic might increase, more and more electricity is used.

I would also say something which I consider extremely important to Croatia's future with respect to energy. It is true that there is gas and some petroleum in our republic. But all of that is not even enough to meet the needs of Croatia itself, and the difference between consumption and the capability for production is made up with imports. There is some coal at Rasa, but the remaining hydropower offers at most 4 billion kilowatt-hours of new power from hydroelectric power plants. That is why development of the fuel and power industry in SR Croatia must go in two directions: utilizing the remaining hydropotential of any significance and the coal reserves, concerning which the effort to conclude an agreement among the republics has been extremely difficult and slow, and turning toward the nuclear program. But that must be a Yugoslav program. Not because we ourselves would not be financially able to afford such an undertaking, but out of the need to reflect on this matter at the level of the entire country. In short, along each of the directions of development there is a need for more community spirit, more specific agreements, and more understanding for the energy troubles faced by the entire country, which will be increasingly serious as the years pass.

VJESNIK: Can there be any more considerable conservation of energy so as to avoid construction of any of the nuclear power plants in that way?

Milan Novak: The republic committee has recently concerned itself more than ever with analyzing energy consumption, and we have arrived at the conclusion that our energy consumption is extremely inefficient! But we have gotten into this situation in large part because of the poor technology which we purchased at the very time when others, the advanced world, were giving it up on a large scale. But carrying out a very extensive program for more optimum energy consumption requires investment of immense capital.

VJESNIK: Changing the structure of the Yugoslav economy would certainly conserve a great deal of electricity or energy in general....

Danilo Feretic: On the question of consumption or conservation I will quote a figure from West Germany. A 19-percent growth of the social product reduced energy consumption 3 percent, but electricity consumption increased 24 percent!

Zeljko Pavlovic: A change in the technological pattern of the entire economy and the training of personnel can be accomplished only over a period of 15 years, and it in fact took twice as much time for many more advanced countries to do this.

VJESNIK: What would happen if Yugoslavia renounced the "nuclear package" in spite of the invitation for bids?

Zarko Petrovic: In that case we would be subject to the Law on International Competitions. There would be many troubles then, since we have to take into account that in addition to paying $20,000 to purchase the tender, each of those competing for the construction contract has invested another $1.5 to $2 million to prepare its bid.

VJESNIK: Should we really be so afraid of those penalties, can Yugoslavia allow itself to do that?

Zarko Petrovic: It is my opinion that Yugoslavia must not allow itself at one and the same time to approve the invitation for bids, to "approve" this kind of action against the nuclear program, and finally use the new law on foreign exchange to give a good drubbing to the planned model for financing construction of the nuclear power plant.

Djuro Miljanic: A few days before the invitation for bids was published there was a meeting of the Nuclear Energy Commission of the Federal Executive Council chaired by its chairwoman Milka Planinc by virtue of her position, and among others the commission included the chairmen of the executive councils of the republics and provinces. This meeting gave the "green light" to publishing the invitation for bids, and it came at the end of a long chain of consultations at the national level.

Naim Afgan: It should also be said that it is not even possible for us not to make a decision on carrying out the nuclear program. But this would involve all manner of adverse consequences for development of the country in one of the most important areas.

VJESNIK: A few days ago there was a news item that one opstina has prohibited construction of storage facilities for nuclear waste, and we have also heard about the decision of the Chamber of Associated Labor of the Assembly of SAP Vojvodina which has rejected the possibility of a nuclear power plant being built in that province. On what basis can such a decision be made, and is this not a phenomenon which is going to be increasingly frequent from now on? What would happen if the fear and hysteria which occur because people are not well enough informed about what is actually involved were to seize others as well?

Naim Afgan: Under the constitution, with respect to investment projects, I think that a permit must be obtained from the competent sociopolitical community. If a permit is not obtained, there can be no construction. Incidentally, something similar happened with the site for possible construction of a nuclear power plant at Vir. But when permits are applied for, there should also be clarification as to what a nuclear power plant is and everything that it would bring to that region. For example, how much would it contribute to the faster development of that town and the entire region? How many people obtain jobs with very good income in Krsko, how much does a source of energy mean for industrial development and the growth of new jobs? These are the things which the news media talk least about, but the electric power industry has also failed in offering data of this kind. Instead, people are served up terrifying stories about cancer, leukemia....

Zeljko Pavlovic: Before the "Krsko" NE was built, that opstina was one of the poorest developed in SR Slovenia. Today in its level of development it is the third sociopolitical community in that republic. Not only because of the power plant itself, but because of all the accompanying activities which have developed in that complex.

Milan Novak: It seems that in examining why there is such a hue and cry about nuclear power plants from certain quarters we should think especially about the developmental impact, i.e., about the location to which social capital is to be committed and about the fear that it will "escape" some people. In accordance with the social compacts there ought not to be fear that the capital will be committed to only one region. The nuclear program ought to bring us closer together and unify us, since numerous Yugoslav organizations of associated labor have participated in it. The general lack of confidence that is manifested at the moment is sowing the seeds of something which would divide us, as some people anticipate!

I agree with open dialogues about nuclear power plants and about everything that they bring, but we dare not allow ethnic divisions and other lines of division to be drawn in the space we have left open because we were late to act in providing all the working people additional information.

[Box, lower left]

Dr Branko Lalovic of the Nuclear Science Institute in Vinca: Five Proposals

Just before we put the paper to bed we received a letter from Dr Branko Lalovic of the "Boris Kidric" Nuclear Science Institute in Vinca, who was prevented from attending our roundtable discussion. He proposed several questions for continuation of the discussion of the future with respect to energy which on this occasion we are opening up in the pages of NEDELJNI VJESNIK.

"I feel that before a decision is made on the nuclear future, other possibilities should also be investigated. With respect to optimalization of consumption and use of renewable sources of energy, and that is what I am mostly concerned with, very little has been done, but experience in the world shows that there is a great untapped potential here," Dr Lalovic said, and he went on to offer five proposals:

"I would recommend that before energy plans are drafted the most responsible people should do the following: First, let them make a trip from Pula to Dubrovnik and ask themselves why there are hardly any solar hot-water heaters on the houses, while the opposite is the case in Greece; and then let them visit Denmark, as was recently done by an Irish energy minister, and study how in a few years the Danes have managed to cut back energy consumption for heating all of 40 percent; third, let them visit the European Economic Community and pick up the dozens of various publications (all of them free) in which the opportunities for energy conservation in industry are described. The fourth proposal is that they invest one-tenth of the expenditure for just one nuclear plant to develop, say, television sets which would consume 5 watts instead of 120 and light bulbs which are sixfold more economical for the same output, and

finally, let them carefully and without prejudice read what we 'solarists' are proposing and then conduct an objective debate about our energy future." We also received similar letters for calls for discussion from other energy experts, and we will be writing about them in later issues of NEDELJNI VJESNIK.

[Box, right]

Possible Builders of the Nuclear Power Plants?

The deadline for receiving bids for construction of nuclear power plants in Yugoslavia expires at 1200 hours on 26 April, and then the bids will be evaluated according to the content of the tender and the Social Compact on the Uniform Procedure for Selection. The decision will be made by the electric power companies of five republics and one province (SR Montenegro and SAP Kosovo did not join in adopting the "nuclear package") and the Yugoslav industry belonging to the organization JUMEL.

At the price of $20,000 the tender was taken by the firms AECL (Canada), Westinghouse (United States), Ansaldo (Italy), Framatome, Aesthome, and Cogem (France), KWU (West Germany), Mitsubishi and Mitsui (Japan), the Government Commission for Nuclear Power of Argentina, and "Atomenergoexport" (USSR). Among domestic work organizations the tender was purchased (at a price of 600,000 dinars) by "Metalna" of Maribor, by "Slovenija Ceste" of Ljubljana, by "Iskra" of Kranja, by "Djuro Djakovic" of Slavonski Brod, by "Jugoturbina" of Karlovac, by "Energoinvest" of Sarajevo, by MIN of Nis, by "Gosa" of Smederevske Palanke, and by "Rade Koncar" and INA-Project of Zagreb.

This, then, is the group of potential builders of the nuclear power plants, and when all the bids are in and the final decision is made we will know what part of the domestic industry will tackle the "job of the century" and what foreign trading partner it will be working with.

7045
CSO: 5100/3028

YUGOSLAVIA

NUCLEAR POWER PLANTS SAID TO BE UNECONOMIC, UNNECESSARY

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 15-17 Mar 86 p 12

[Excerpt] The view of the workers council of the Associated Electric Power Industry of Belgrade, which discussed at the end of last week further investment in research of nuclear raw materials, is that one cannot accept the assessment that building nuclear powerplants is economical for the country and that they are necessary at this time because of the rapid exhaustion of domestic coal and water resources.

Delegates at the special meeting [of the council] were surprised by the agenda item on preparations for building nuclear powerplants, since the meeting was called above all to reach agreement on common elements in forming prices for electric power in Yugoslavia. Resistance to atomic powerplants was immediately expressed in the discussion and as a result, decisions on allocating funds for further research in preparation for their construction were postponed.

In the end it turned out that no one was against research which will prepare Serbia to enter into this work if nuclear power plants are shown to be necessary in the 1995-2000 period. The Associated Electric Power Industry believes water and coal resources make it possible to be cautious about issuing decisions regarding the time for building nuclear power plants, [also] because of the possibility that new technology will appear [in this field]. On the basis of this, the Associated Electric Power Industry will define what will be done so that a decision will be made for the periods when there is a shortage of traditional fuel.

/8918
CSO: 5100/3029

YUGOSLAVIA

DEVELOPMENT OF NUCLEAR POWER PLANT PROGRAM SURVEYED

Belgrade EKONOMSKA POLITIKA in Serbo-Croatian 17 Mar 86 pp 19-21

[Article by Dragoslav Nedljkovic: "Unity on the NE Program"; first paragraph is EKONOMSKA POLITIKA introduction]

[Text] It is difficult to discern why suddenly and unexpectedly so much space in the news media is being devoted to nuclear power plants at the height of the public discussion of the critical analysis of the political system and on the eve of the elections, the party conferences and congresses, and the change of executive bodies. For almost a month now the newspapers, radio, and television have been flooded with news items, opinions, and views concerning nuclear energy without any direct occasion, roundtable discussions, lectures, interviews, and lecture series are being organized, and everyone is becoming involved from young people and writers to the delegate assemblies and the LCY Central Committee. Everything is being published, from news items and analysis of foreign experiences to the personal predispositions of individuals, and a Yugoslav referendum is being demanded on the question of being for or against the introduction of nuclear power.

Even the experts cannot get their bearings in this profusion of contradictory information. When in the Western countries the advocates of preserving the environment, the Greens, as they are popularly referred to, organized protest marches and printed up posters and pamphlets, it was said that this was organized and financed by espionage centers in the opposite ideological camp. Manufacturers of equipment for nuclear power plants and their builders in the West feel even today that the lack of confidence of the public, or put more accurately, the lack of adequate information and the excessive exclusiveness and secrecy about construction and operation of nuclear power plants, is one of the principal oversights and causes of the standstill. Who is it that will be accused in our country?

To say that domestic energy people committed the same oversight with informing the public is obviously not enough. A referendum is not even necessary on that account, since its outcome is known in advance. In essence, however, there is no dilemma about introducing nuclear energy into the Yugoslav electric power system, and it is being created artificially. It was permitted back in 1974, when construction began on the Krsko NE, the first nuclear power

plant which has been operating for 4 years now. Whether it is to be joined in this century by one or two more nuclear power plants is the real question, especially since the new power plants are to be built on an entirely different principle from the first one. It is well known that the Krsko NE was built on the "turnkey" principle, with predominantly foreign credit financing.

How To Avoid Division

The nuclear program as it is now under discussion was brought about by several circumstances. Even some 20 years ago energy specialists in the Serbian Academy of Sciences and Arts organized three scientific symposiums: on domestic sources of energy, on the growth of consumption, and on the future facilities that would meet that demand. In compressed form the conclusions (which incidentally are well known) of those gatherings run this way: a) Yugoslavia does not have an abundance of natural energy resources, b) consumption will continue to increase at a rapid pace, and c) assuming optimum use of conventional sources there will be a need to bring in new technologies and processes for the production of energy. This was followed by several analyses and studies concerning the need to use nuclear energy in the electric power industry. Thus some 10 years ago it was estimated that electric power consumption in Yugoslavia would reach 230 billion kwh a year at the beginning of the next century. Assuming maximum utilization of the remaining hydroelectric potential and construction of thermal electric power plants at all the sizable coal deposits, calculations have shown that consumption could be "covered" by conventional sources up to the year 2025, but after that exclusively nuclear power plants would have to be built.

In that period nuclear power plants seemed like the only source of electric power for the future, and it was also said that they would be more economical than the conventional power stations. The domestic dilemma was whether to wait 40 to 50 years and only then to build nuclear power plants or to gradually bring them into the system, master the technology, and impart the capability to the industrial sector. The professional opinion that prevailed was that for the electric power industry and even more for the industrial sector, for which this would be an engineering and technological leap forward and an opportunity for getting out into the world, it would be better to build nuclear power plants than to use conventional domestic sources of energy.

A country's electric power industry, as a large technical and economic system, has great advantages over partial regional systems: immense savings are possible in construction of new projects, in building up standby power, and in optimizing utilization of facilities already built. When discussion began concerning construction of 10 or 12 nuclear power plants by the year 2000, Yugoslavia's electric power system was artificially divided into 8 republic and provincial entities, and the experience with that division had been very bad. The most recent study by "Energoprojekt" shows that assuming the system were placed on an economic foundation, it would be possible today to save 1,000 MW of installed capacity just in the construction of new projects (the price per megawatt is $1 million for thermal electric power plants, which means that the saving would amount to $1 billion). But the bad experiences were not confined to more expensive construction alone. The "independence" of the sociopolitical

communities and their electric power industries resulted in the importation of a motley variety of equipment, especially for thermal electric power plants, every organization had ties to "its own" foreign trading partner, the level of borrowing abroad was high, and the domestic industry was left without work. "The concomitant difficulties" have been shortages of electric power, power cutbacks (no one has even attempted to calculate how much they cost), losses in the electric power industry, a lag in development, and so on.

The desire to avoid divisions and their consequences has not been publicly expressed, but the specialists believed that it had to be imposed on large and expensive projects with significant technical advances which do not tolerate fragmented systems. That is how the ring of high-tension long-distance transmission lines was carried out; this exceptional engineering solution makes it possible to build power plants according to the location of the natural resources and to transmit power to consumers virtually without losses, but nothing changed. The divisions were even reinforced and became deeper. That is how the nuclear program came to be conceived. It turned out that in the fragmented system not a single electric power organization had the technical capabilities of either incorporating a nuclear electric power plant or making the financial investment. The program simply made it a necessity to work together.

Strategic Designs

On the basis of several studies on the inclusion of nuclear power plants, the mastering of nuclear technology and the tacit "conspiracy" of the specialists resulted in a sociopolitical commitment and strategic designs for applying nuclear power plants in Yugoslavia. In 1977 the SFRY State Presidency stated the following basic premises: a) nuclear power plants had to be incorporated into the electric power industry, b) it was essential to equip the domestic industrial sector as much as possible for building nuclear power plants within the country and in the world, and c) gradually a capability had to be developed in this field and the entire range of the nuclear fuel cycle mastered.

It is difficult to explain in a few words why it took 5 years for the Federal Executive Council and the republics and provinces to arrive at the Agreement on Use of Nuclear Energy, and after that another 3 years for the electric power industries to agree on a procedure for arriving at a single fuel cycle and single type of reactor. It seems that there was a mistake at the outset--the barriers and divisions in the electric power industry cannot be erased by new and more up-to-date facilities, since it is pointless to build a modern building on rotten foundations. It seems that it was necessary to do things the other way about--to straighten out relations, above all through economic coercion at the base, and only then to talk about the superstructure.

Over those 8 years that passed from formulation of the strategy of nuclear development until the international competition was advertised for selection of the single fuel cycle and reactor type for the series of nuclear power plants a great many things changed. Estimates of electric power consumption in the year 2000 were cut back drastically from 230 billion to 160 billion kwh. Assuming intensive utilization of domestic natural resources, that is, coal and water, there was also a decrease in the number of nuclear power plants which

were to be built. The long-range program for development of the fuel and power industry included four nuclear power plants, one to be put on line in 1995, a second in 1998, and the other two in the first years of the next century. Although within six electric power organizations there are already organizations for preparation and construction of nuclear power plants, the decision has so far been made to build only one--Prevlaka near Zagreb, whose investors are the electric power industries of Croatia and Slovenia.

It is, of course, uncertain what size of consumption of electric power will be achieved in 15 years. That depends on many circumstances, above all on the country's rate of development as a whole, that is, on the manner and road we take in getting out of the present crisis. The stubborn facts say that with a per capita annual consumption of about 3,500 kwh Yugoslavia is near the very bottom among European countries, that is, where the advanced countries were 30-40 years ago. Efficiency of utilization of energy as a whole and also of electric power is extremely poor, and it is getting worse and worse. It took 3.58 megajoules of energy per dinar of the social product in Yugoslavia in 1981, 3.80 in 1982, 4.10 in 1983, and 4.40 in 1984. Consumption per 1,000 dinars of the social product was 151.6 kwh in 1981 and 171 kwh in 1984.

The lag in development and efficient use of energy is also evident to the naked eye, so that radical changes in energy policy, in the valuation of energy, and in consumption are simply imperative. The specialists say that it will be difficult for Yugoslavia to get away from the bottom of the European list of countries even if the present development programs are carried out. And it is almost certain that they cannot be carried out. Full utilization of the remaining hydroelectric potential, opening up mines for 160 million tons, and construction of thermal electric power plants can no longer be carried out over the remaining 14 years even in physical terms, not to mention the investments that would be necessary. The administrative, artificial, and noneconomic divisions in the electric power industry stand in the way of optimum development; neither hydroplants nor thermal electric power plants are being built at the most favorable sites. The classic examples of these are the Drina watershed and the coal deposit in Kosovo, which have been the subjects of disputes for decades now. The "owners" (under the constitution they are the sociopolitical communities) are not utilizing them or are underutilizing them but they do not allow others to do so. This is compelling the republics and provinces which have scant energy resources to seek a way out through nuclear power plants, since, once again under the constitution, they have a duty to provide energy for their own development.

And although the nuclear program, at least with respect to selection of the fuel cycle and the reactor type, was approached with unity after the detailed and extensive studies, one should have no illusion that the divisions concerning energy have been overcome. The example of choosing sites for nuclear power plants is sufficient. Krsko, which is already on line, and Prevlaka, which is to be built, would be among the least favorable sites in any Yugoslav selection, since the geological conditions, seismic situation, amount of water for cooling and other essential elements have required increased investments at those sites. On the basis of studies done so far the best location for a nuclear power plant is at Djerdap, but this is not even mentioned as a site

for a future nuclear power plant. The real paradox and pattern of behavior are represented by what is happening in Vojvodina: the electric power industry in that province has made a stipulation on its willingness to build a nuclear power plant jointly with other organizations, and the condition is that it be located in Vojvodina. The delegates to the Vojvodina Assembly have passed a law establishing an organization for preparation of construction and providing the funds, but a few days ago (as though their memory had failed them) they ordered the halting of all preparations and an inquiry to find out who made the decision.

The divisions over energy which affect the nuclear program are not confined to the choice of a site. It seems that they are still more evident concerning choice of a foreign supplier of the reactor and technology; this question involves not only the electric power industries, but also the project planning organizations, researchers, machinebuilders, assemblers, construction contractors, and other participants in the "big job." This is a separate topic which we soon will be addressing.

Delays Again

It is difficult to believe that the members of the SFRY State Presidency in 1977, when the strategy for inclusion of nuclear power plants was formulated, were aware how much time it would take to arrive at a Yugoslav program governing nuclear power plants. It seems they did not even suspect (nor in fact did the most eminent world specialists) that in less than 10 years nuclear technology in certain countries would be proclaimed outdated and superseded, technology for the scrap heap. To tell the truth, the reports and analyses coming in from the world on nuclear power plants have not been complete or thorough. Whereas they are being completely rejected in some countries, construction is being halted, and plans are being made to shut them down, they are being built at a fast pace in other countries. In both cases electric power consumption is the principal factor: structural changes in the economy, optimalization of energy consumption, and other factors have made the former plans for the growth of consumption unrealistic in several countries, but in those countries which are "energy-hungry" they are continuing to build nuclear power plants if at a slower pace. Safety requirements, ecology, waste disposal, and the disassembly of nuclear power plants are making nuclear technology considerably more expensive (true solutions have not yet been found for some of these problems), so that there are additional reasons for doubt.

Yet the future for energy is being spoken about little and timidly. Whereas nuclear power plants represent the future, that is, what will be happening over the next 10-15 years, for our energy people, for the world at large the future is represented by new technologies, more accurately, predictions running several decades ahead. A majority of specialists agree that the world's energy future lies in fusion, the use of deuterium, which guarantees an abundance of energy with no impact on the environment. Breeders, migma cells, and the like are being mentioned. It seems that the technical problems have been solved for fusion, but commercial use will probably take 3 to 4 decades. Immense resources have been invested in research on this new technology, and a part of the campaign against nuclear power plants should be viewed as a need

to get back that investment and make money. The use of fusion is the immediate future for planners. It is certain that this technology will cost fabulous amounts and that only a few countries will possess it.

In that light the story about the Yugoslav nuclear program requires thorough reassessment and adjustments. The question is posed once again whether to build a series of nuclear power plants or to wait for the new technologies by making intensive use of conventional energy resources. Even if it is necessary to build several nuclear power plants until fusion is accessible, it is late to carry out a strategic commitment on adoption of a nuclear fuel cycle and to equip the industrial sector for manufacturing vital parts of nuclear power plants. Over the 3.5 decades since the first nuclear power plants went on line in the world the domestic industry has not managed to become involved in nuclear technology. There is an exception in a few organizations which have for years been fairly successful in making parts for nuclear power plants of the VVR type (the Soviet type of light-water reactor). All attempts to obtain contracts for other types of power plants of foreign manufacturers have been unsuccessful.

It would not be out of the way to recall that one of the fundamental principles of the strategy of the nuclear program dating back some 10 years was to equip the domestic industry as much as possible to build nuclear power plants within the country and in the world. Adoption of the fuel cycle involves mastering some 8 completely new industries and technologies if we are talking about enriched uranium as a fuel, and it makes economic sense only if 10 or so nuclear power plants are built.

One of the characteristics of Yugoslavia's energy development has been its constant tardiness and blind following of changes in the world, its sluggish adaptation to world trends, and in certain periods its moving in completely the opposite direction. When the world was cutting back petroleum consumption, we recorded our largest growth; whereas optimality and efficiency have increased in the consumption of energy, in our country energy is wasted and efficiency is deteriorating; when others stopped building oil-fired thermal electric power plants, we were just getting started. Is the same thing going to happen with the nuclear program? It is obvious that the energy situation as a whole imposes a different approach, from placing an economic value on the sources of energy and production to eliminating artificial divisions. It is also certain that the nuclear program may not be an exception; if overall relations have been set up badly, it is an illusion to expect that high technology will follow a different road.

[Box, p 21]

A Loss Avoided

The Krsko Nuclear Power Plant operated over the past year for the first time as a work organization--up until now it has been an organization under construction. Its first year-end statement did not show a loss (although given the noneconomic power rates, a loss need not reflect business performance) since the sociopolitical community covered in advance the losing business operation.

The investments in Krsko, with an installed capacity of 664 MW, amounted to slightly more than $700 million, which at the time of construction was not excessively expensive in the dollar amount when compared to world prices of that period. Foreign credits represented about $550 million. Since the credits are not being repaid, but the debts are being rescheduled, Krsko is becoming more expensive even after completion of all the work. The foreign debt, according to unofficial reports, has already exceeded $1 billion.

7045
CSO: 5100/3030

YUGOSLAVIA

ACADEMICIANS ON POSTPONEMENT OF NUCLEAR PLANT CONSTRUCTION

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 21 Mar 86 p 8

[Excerpt] The 3-hour exchange of views by the most prominent energy specialists in the country at the Inter-Academic Council for Energy in Belgrade on the need to build nuclear powerplants can be summarized as follows: The construction of nuclear powerplants can be postponed; although there is not so much time, so it should be used to the maximum to gain a perception of the coal and water potential reserves and their accelerated use in electric power production, to introduce more efficient consumption of power, and to train specialists for selecting and applying more modern nuclear technology.

According to the comprehensive speech by Academician Hrvoj Pozar on domestic resources and assessments on the increase in electric power consumption up to 2020, on the need for nuclear plants in the electric power system, on investments for building various electric powerplants and the cost of electric power, power from nuclear plants will be needed after the year 2020. This means that by then a specific number of them should be built. Pozar gave several variants on inclusion of nuclear plants in the power system, depending on power consumption and use of coal reserves and the building of mines. The lowest increase in consumption of electric power ranges from 3.7 to 3.95 percent annually. By the year 2020, 12 nuclear powerplants should be built in order to meet somewhat higher consumption than this; and in order to meet needs above a 6-percent annual increase, 21 nuclear plants of 1,000 megawatts should be built.

As noted in the discussion, Pozar used only the coal and water reserves from the Strategy on Long-Term Development of Energy. Prof Dr Momcilo Simobovic, however, brought out data on newly established reserves which are about 40 percent higher and which pertain largely to reserves in Kosovo.

Academician Pavle Savic, a pioneer in nuclear science in Yugoslavia and one of the oldest researchers in the world, said that one needs more 'modesty' now and it is more a question of the efficient consumption of energy and the preparation of personnel [in the field of] fast reactors to be used in the future; none of the developed countries are building any longer those which are now being offered, [he said].

/8918
CSO: 5100/3029

BRIEFS

PUMP UNITS FOR USSR--Nis, 7 March (TANJUG)--The machine producer "Min" of Nis and the Soviet enterprise "Atomenergoexport" of Moscow has signed a new contract on the delivery of 12 pump units for Soviet nuclear power plants. The 4 million dollar project is to be completed in 1987. The pump units will be produced by the factory "Jastrebac" of Nis, a constituent part of "Min". "Min" will this year deliver 20 pump units for nuclear power plants to partners in the Soviet Union, Bulgaria, Czechoslovakia and the German Democratic Republic. The deliveries are valued at some 7 million dollars. [Text] [Belgrade TANJUG in English 0930 GMT 7 Mar 86 LD] /12913

URANIUM FROM PHOSPHORIC ACID--Belgrade, 31 March (TANJUG)--After three years of research Yugoslav scientists have mastered a process for separating uranium from phosphoric acid, it was announced here today. The country's first quantity of uranium concentrated was obtained in a [word indistinct] industrial facility at the chemical plant in Prahovo, eastern Yugoslavia. An investment programme to build the country's first industrial facility for the production of uranium by this method will go ahead if current investigation proves the project profitable. The programme is being financed by Nuklearna, an enterprise affiliated to the electric power industry of the Republic of Serbia. The republic has not yet made a decision on building a nuclear power plant. Yugoslavia has one nuclear station at present, Krsko, and is making preparations for the eventual building of another four. [Text] [Belgrade TANJUG in English 1723 GMT 31 Mar 86 LD] /12913

CSO: 5100/3032

BRIEFS

ARGENTINE-BRAZILIAN NUCLEAR POLICY MEETING--Buenos Aires, 25 Mar (NA)--The Foreign Ministry has offfcially reported that the first bilateral Argentine-Brazilian meeting on nuclear policy took place here yesterday and today. This meeting was scheduled in the joint declaration signed by Presidents Alfonsin and Sarney in Aguazu last November. The delgations were headed by Ambassador Jorge Sabato, secretary of foreign relations and culture, representing Argentina; and by Ambassador Sebastian Rego Barros, representing Brazil. The technical aspects of the meeting were coordinated by Alberto Constantini, chairman of the National Atomic Energy Commission; and by Rex Nazare Alves, chairman of the Brazilian Nuclear Energy Commission. The next meeting will take place in Brasilia in the first week of August, according to the Foreign Ministry. [Text] [Buenos Aires NOTICIAS ARGENTINAS in Spanish 2200 GMT 25 Mar 86 PY] /9738

CSO: 5100/2056

ARGENTINA

CNEA TO DEFINE NEW NUCLEAR POWER PLANTS

PY291644 Buenos Aires TELAM in Spanish 1949 GMT 26 Mar 86

[Text] Buenos Aires, 26 March (TELAM)--By resolution, the Argentine Government has decided that the National Commission for Atomic Energy (CNEA) will be charged with defining, for the natural uranium-heavy water line, the type of nuclear power plant best suiting the country.

This resolution was enacted through executive Decree No. 423, which was released tonight at Government House, and charges the CNEA with defining the most appropriate capacity module of the nuclear power plants in order to fulfill the goals set by the energy program through the year 2000. The preamble for the decree notes that, in its energy program, which has already been drawn up, the Public Works and Services Ministry foresees the installation of a 700-megawatt nuclear power capacity before the year 2000.

The preamble adds that for an appropriate planning of the CNEA activities and those of the entire Argentine nuclear industry, it is indispensalbe to determine, for the natural uranium-heavy water line, the type of power plant to be built and the capacity module. The decree emphasizes that it is important to speed up the technical studies to locate a site for the fourth nuclear power plant and to decide the type of power plant in order to permit the greatest possible participation of the Argentine industry and engineering.

/12913
CSO: 5100/2057

BRAZIL

GOLDEMBERG COMMENTS ON FRG ACCORD, NUCLEAR BOMB

Sao Paulo ISTOE in Portuguese 19 Feb 86 pp 70-71

[Interview with Jose Goldemberg by Maria Helena Passos]

[Excerpts] One of the most outspoken critics of the 1975 Brazil-Germany nuclear accord, southern physicist Jose Goldemberg, 58, has stepped into his role as rector of the University of Sao Paulo armed with attributes that go beyond the prestige he garnered as president of the Brazilian Society for the Advancement of Science [SBPC] and of the Brazilian Physics Association. After 3 years successfully headding the three state electrical energy enterprises in Sao Paulo under the Montoro government, he is ready to reinvigorate the USP, stimulating research, recovering the professional pride of its professors and garnering additional funds. Moreover, he is taking a more critical stance with respect to the New Republic, no longer advocates, as before, the total revocation of the nuclear accord, and does not disguise his aspirations to a future ministerial position.

[Question] In your view, is Brazilian scientific development satisfactory?

[Answer] Areas such as computer science, electronic engineering, physics and genetics are doing reasonably well. On the other hand, there are other sectors which are on shaky ground. We need to strengthen them, and I intend to do just that. I will begin with a special fund, with extra-budgetary resources, to be administered by the rectories of the Sao Paulo universities to assist areas lacking in research. The groups financing research have priorities, which stimulate some areas while ignoring others. For example, metallurgical engineering in Brazil has, up until now, not been well developed, whereas space research has. Which does Brazil need most, metallurgical engineering or space research? At the same time, there are limits fixed by the scientists' own biases which influence the development of research. If these biases were formed on the basis of regional needs, there would be no problem. But they are formed outside of the country. It is fashion that determines, for example, the research done in elementary particles in physics.

[Question] The Brazil-Germany nuclear accord was the target of some of your sharpest criticisms in the 1970's. Have you changed your position?

[Answer] We have to be realistic. It is not possible to do away with Angra II, the first German reactor. The equipment is all bought and debt is owed. I think the accord should be broken with respect to the other reactors in the future. Angra III is plainly an unknown quantity. It would need to be examined in greater depth, but I think it would be a good idea to sell the equipment already purchased to another country. That might appear to be a bit of a retreat on my part, but it is realistic and avoids the total loss of the 4 billion dollars already invested.

[Question] Are you satisfied by the commission named by Minister Aureliano Chaves to study the accord?

[Answer] It ended up being slanted in favor of nuclear energy. For that reason, the SBPC and the Brazilian Physics Association formed their own team to study the program and I was invited to head it. I proposed that it not begin its work until after Aureliano's commission has concluded its own. That way we would get a chance to hear them out.

[Question] That was a political position, right?

[Answer] It is the position of a good boy, something not very common in my life.

[Question] Do you believe that the military is developing plans for the Brazilian atomic bomb?

[Answer] I have no doubts that the plan exists. They are developing activities seemingly not aimed at construction of the atomic bomb, but which augment Brazil's capacity in the area of nuclear energy, with possible military applications.

[Question] Two years ago, you told ISTOE that the military did not have the ability to do that.

[Answer] That work is technically complicated. It's going to be difficult for them to do it alone.

[Question] In that case, should Brazilian scientists act as they did when they fought the nuclear accord 10 years ago?

[Answer] Certainly. They have been timid in the face of the already high costs that the country has incurred because of this. The scientists are going to study the parallel plans in an independent commission. If Aureliano's commission does not take action on it, the scientists will step up their activities.

[Question] Has the recently created Ministry of Science and Technology been effective in improving laboratories and providing funds for research?

[Answer] It was a good beginning, very much improving the dialogue between scientists and the government. But it started out amputated. It should have

brought together many other activities responsible for science and technology--such as the National Institute of Industrial Property, which controls the entry of foreign technology, and the National Commission for Nuclear Energy (CNEN). It only retains the National Council of Scientific and Technological Development and the Research and Studies Bank. To dress these two old organizations in new clothes does not change very much: they still don't have much money. Minister Renato Archer has performed his duties reasonably well, but the means at his disposal are extremely limited.

[Question] Do you foresee the inclusion of the CNEN in the Ministry of Science and Technology under the New Republic?

[Answer] I am very skeptical. The New Republic has already been disappointing in several areas. It could have taken firmer actions and did not. For example, in the Brazilian Forestry Development Institute, the president was fired for corruption and almost 6 months passed before measures were taken to improve morale.

[Question] What is the Brazilian scientist's role in this framework?

[Answer] The majority of my colleagues have adopted the position of collaborating with and supporting the government. But a lack of resources is already making itself felt. They are tired of supporting a government that is not able to state its position with regard to fundamental issues. Personally, I believe that the scientific community should continue to collaborate while taking an increasingly demanding stance.

[Question] But you would like to hold a ministerial position, right?

[Answer] Yes. The president of the republic gives very few orders to the ministers and they have considerable freedom. But I am not attracted to a temporary ministry like the next one will be. I would only be interested in taking responsibility in a government that proposes to have a program during an entire term. On the other hand, I wouldn't USP. There I can act and I have a forum to express my opinions.

13026/6662
CSO: 5100/2048

BRAZIL

CONSTRUCTION OF FOURTH PLANT CONCERNS FORMER NUCLEN HEAD

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 28 Feb 86 p 36

[Text] Rio--The former director of the Nuclebras Engineering Corporation (NUCLEN), Joaquim Francisco de Carvalho yesterday expressed his concern that the Committee for Evaluation of the Nuclear Program might recommend to the Sarney government construction of another nuclear plant in addition to Angra II and III, with a loss to the nation of $4 billion.

Joaquim de Carvalho, who was recently testifying before that committee, said that he heard one member of that committee support the construction of another plant under the allegation that Brazil will not be able to utilize its hydroelectric potential completely because that would flood many areas usable for agriculture.

In his opinion, the committee should not recommend "such an absurdity" to President Jose Sarney because that would further compromise the investment capacity of the electrical sector, which would end up not even having the funds to build the transmission lines, the lack of which results in blackouts such as those we had last year.

Joaquim de Carvalho supports the position that the Brazilian hydroelectic potential can cover energy demand until the second decade of the next century provided that the program for construction of hydroelectric plants proceeds at its normal pace and that the transmission lines necessary to carry the power to the consuming regions are built. There thus will be sufficient time in the nuclear area to test a prototype reactor and later build that reactor on an industrial scale because the demand for energy will be felt after the year 2015, that is, 30 years from now.

In his testimony, the impression was also left that several members of the committee are in favor of the institutional restructuring of the nuclear sector, with NUCLEBRAS retaining the fuel cycle, ELETROBRAS, the electronuclear activities, and the National Nuclear Energy Commission, the research and applications of radioisotopes in industry, agriculture, and medicine. Regulatory activities and those of control and inspection would be in charge of a new agency to be created and attached directly to the Presidency of the Republic to maintain its independence and authority in relation to the others. According to Joaquim Francisco de Carvalho, the creation of that new agency would be subject to the approval of the national congress.

8711/6662
CSO: 5100/2051

BRAZIL

BUSINESSMAN'S PARTICIPATION IN PARALLEL PROGRAM NOTED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 25 Feb 86 p 2

[Text] Rio--Businessman Antonio Ermirio de Morais was installed yesterday as a member of the deliberating council of the National Nuclear Energy Commission and participated in its first meeting, which lasted about 3 hours. The chairman of the commission, Rex Nazare Alves, considered this fact indicative of the collaboration that the businessman has always given to the nuclear sector and of the fundamental importance of that technology for Brazilian development.

Rex Nazare Alves explained that although Antonion Ermirio de Morais has been one of the sharpest critics of the Brazilian-German nuclear agreement, he has been collaborating for some time with what is commonly called the parallel or autonomous nuclear program. In that line of collaboration, when the Nuclear Energy Research Institute (IPEN) of Sao Paulo was developing the project for the production of uranium hexafluoride (UF-6) and needed hydrofluoric acid with a low humidity content, it was the Antonio Ermirio de Morais' enterprises that produced that material for IPEN.

Rex Nazare Alves pointed out that the Antonio Ermirio enterprises also have been supplying a special aluminum with a certain type of purity for the manufacture of uranium fuel elements. In his speech greeting Antonio Ermirio, the CNEN chairman said that the commission's foreign debts do not exceed 10 percent of its budget and that thanks to the development of its own technology, the importation of radioisotopes and other nuclear materials is being reduced significantly.

8711/6662
CSO: 5100/2051

BRIEFS

NEW NUCLEAR COMMISSION AUTHORITIES--The following are the newly appointed authorities of the Executive Board of the Chilean Nuclear Energy Commission: Major General Patricio Torres as Mining Ministry representative; Brigadier General Jorge Massa for the National Defense Ministry; Rear Admiral Sergio Altamirano and Brigadier General Luis Reyes as representatives of the president of the Republic. [Summary] [Santiago EL MERCURIO in Spanish 23 Feb 86 p C 2 FY] /9738

CAO: 5100/2055

INDIA

CONGRESS-I LEADER URGES COHERENT NUCLEAR POLICY

Calcutta THE STATESMAN in English 8 Mar 86 p 13

[Text] New Delhi, March 7--In what looked like a surprise move, Mr K. K. Tewary, secretary of the Congress (I) Parliamentary Party, yesterday asked the Government "to take the nation into confidence and declare a coherent nuclear policy for survival of the country and its hard-won freedom," asserting that "nuclear weapon is necessary for our survival."

In a statement issued to the Press, the party secretary said: "We have been astoundingly ambivalent to this vital issue which concerns our national security, and the very survival of the nation."

He disapproved of the "extraordinary stand" taken by Mr Arun Singh, the State Minister for Defense, in the Janvant programme of Doordarshan "in giving vent to his personal views, though people were interested in knowing whether his personal views had any bearing on the official policy."

According to Mr Tewary, Mr Singh had stated in course of his answers that while the Government of India believed in peaceful uses of nuclear energy, he personally wanted the Government to now exercise its nuclear option and go in for production of nuclear weapons. Mr Tewary thought this "ambivalent" attitude should be given up.

He held that "India's security environment has deteriorated alarmingly and our security system has gaping holes and is no match for the threat scenarios which are emerging due to Pakistan's acquisition of nuclear capability and the total convergence of its geo-strategic interests with those of China and America in this region.

"Pakistan's nuclear capability and the decision of its patrons in Washington to double the military aid package to Pakistan has drastically altered the balance of power on the sub-continent and we can ignore it only at our peril. All the friendly gestures of Pakistan are calculated to hoodwink us and lull us into complacency. Our gullibility should not be allowed to endanger the security and integrity of the nation."

Mr Tewary pointed out that "along with Pakistan, the situation in Sri Lanka with the involvement of the Americans, British, Israelis and Pakistanis is yet

another threat to India's security from a traditionally safe side. The threat perception of Pakistan's nuclear bomb is an extension of coercive diplomacy and blackmail to which India is being subjected by the imperialist forces which are determined to destabilize our political system and dismember our country. In the present situation India has no option but to go into nuclear weapons and mobilize the masses to face the onslaught on the freedom and sovereignty of the nation."

/9274
CSO: 5150/0083

INDIA

BRIEFS

U.S. TEST CRITICIZED--New Delhi, 24 Mar (AFP)--India on Monday criticized as "highly regrettable" the latest U.S. underground nuclear test. Foreign Minister Baliram Bhagat said in a brief reference during a debate on his ministry's budgetary demands in Parliament that the U.S. Government should heed international public opinion and reconsider its policy on this crucial issue. The underground test explosion was carried out in the Nevada desert Saturday. [Text] [Hong Kong AFP in English 1524 GMT 24 Mar 86 HK] /9274

JAPANESE FUSION DEVICE--Tokyo, 10 Mar--Under a contract signed recently with the Saha Institute of Nuclear Physics, a division of India's Department of Atomic Energy, the giant Toshiba Corporation will supply the Institute a Tokamak nuclear fusion device for experimental use. Under the terms of the contract, Toshiba will not only design and manufacture the fusion device but also supply capacitor banks, auxiliary equipment and technical service for the Tokamak device. It will be the first export of nuclear fusion equipment from Japan. Prior to undertaking the actual manufacturing work, Toshiba said it had built a scale model of the device in order to ensure that the best possible design and manufacturing technique were used. The main parameters of the Tokamak device are given as follows: major radius 300 mm, minor radius 75 mm and toroidal field 2 tesla. Toshiba said the Tokamak type fusion devices are expected to be the most feasible among various types of nuclear devices and they have been constructed and studied in leading industrialised countries such as the U.S., Japan, Western European countries and the Soviet Union. [Text] [Madras THE HINDU in English 11 Mar 86 p 5] /9274

CSO: 5150/0084

PAKISTAN

FORMER IAEA HEAD CITED ON NUCLEAR PROGRAM

BK060939 Karachi Domestic Service in English 1700 GMT 5 Apr 86

[M.I. Lashkar commentary]

[Text] Pakistan is a peace-loving country, and it cannot be anything contrary. So are peaceful purposes of its modest nuclear program. That is what is being emphasized by Pakistan, and that is what is being increasingly recognized by professional experts all over the world, in spite of the fact that certain quarters are questioning the peaceful nature of Pakistan's nuclear program for a political motive.

The latest such appreciation came from a person no less than the director general emeritus of International Atomic Energy Agency. Dr Sigvard Eklund, who headed the IAEA for 2 decades, categorically stated that Pakistan's nuclear system fulfilled the requirements of his agency for nonproliferation. Dr Eklund made the statement in Islamabad before leaving Pakistan last Monday [31 March] after a 5-day visit to the country during which he visited various nuclear installations and research centers in Pakistan.

Dr Eklund's professional view of Pakistan's nuclear objectives nullified the persistent misinterpretation about Pakistan's motive in acquiring nuclear know-how. Dr Eklund's remarks that additional safeguard conditions over and above those of his agency's which the Pakistani program fulfilled put by the supplier countries were being questioned in certain quarters also lends support to the view that the sustained propaganda campaign against Pakistan's nuclear program had been launched with ulterior motives. The propaganda and the suppliers' refusal on that account to supply spare parts for Pakistani installations have only impeded Pakistan's development in this particular area. But the motive is [words indistinct].

Dr Eklund, who lauded the achievements of Pakistan's Atomic Energy Commission in various fields, also recognized that the indigenous capacity and skill available in Pakistan acquire the nuclear option for application in the development process and said without cooperation from the developed countries Pakistan's nuclear achievements would merely be slowed down and would only take a longer period.

Indeed, Pakistan's energy gap is not the only reason for the country's nuclear program. The agricultural sectors which generate nearly one-third of our GNP have in some instances benefited immensely from the application of nuclear technology in the field. The extension of nuclear technology in the medical fields in the form of nuclear radiation and radioisotopes has proved its merits. And to any unbiased mind Pakistan's interest in the nuclear fuel cycle can only be based on technical and economic considerations.

It is Pakistan's consistent opposition to a vertical and horizontal proliferation of nuclear weapons that gives credibility to Pakistan's legitimate demand for access to a technology which is considered essential for modern-day progress.

/9274
CSO: 5100/4740

BRIEFS

PRC, PAKISTAN COOPERATION HINTED--The Defense Ministry's annual report for 1985-86 has said that Pakistan's determined quest for making a nuclear bomb and China's modernization program with military overtones have obvious bearing on India's security. The report says that China is widely believed to be involved in Pakistan's nuclear program. The continued flow of arms into Pakistan from the United States is another matter of serious concern to India. The ministry underlined the need for taking appropriate countermeasures in view of the fact that external forces could interact with internal forces of dissent in the political and socioeconomic spheres adding to our security problems. The report says there has been an increase in the number of contacts with China and bilateral relations between India and China have expanded in areas of trade and technical and cultural exchanges. [Text] [Delhi General Overseas Service in English 1330 GMT 31 Mar 86 BK] /6091

ZIA REITERATES PEACEFUL USE--The director general emeritus of the International Atomic Energy Agency [IAEA], Dr Sigvard Eklund, called on President Mohammad Ziaul Haq in Rawalpindi this evening and exchanged views with him on Pakistan's peaceful atomic program. The president reiterated Pakistan's intention to acquire atomic energy for peaceful purposes. He expressed the hope that the states with nuclear technology will understand Pakistan's immediate need for atomic energy and cooperate in this regard. The president agreed with Dr Eklund that the Agricultural and (?Biological) Atomic Institute in Peshawar has played a prominent role in achieving a better harvest this year in Pakistan. He also appreciated the progress in the medical field, with thousands of patients benefiting from new treatment methods. The IAEA director general emeritus said Pakistan (?badly) needs atomic energy for its development and is fully justified in its efforts to acquire such modern technology. Dr Eklund said he recognizes that Pakistan is reaping many benefits from its investment in atomic energy, such as in the fields of agriculture and medicine. Speaking at a news conference before his departure, he said IAEA will help in the development of atomic energy in Pakistan especially for generating electricity. [Text] [Karachi Domestic Service in Urdu 1500 GMT 31 Mar 86 BK] /6091

IMPROVED CHANCES FOR CHASHMA PLANT--Islamabad, March 11: In what is regarded as a very positive development Pakistan is reported to have at last succeeded in establishing its nuclear "innocence" in the international corridors of power. While a formal objection certificate is not expected to be issued by those who had in the past led an intense campaign against Pakistan's nuclear intentions it is, however, believed by knowledgeable circles that the country's efforts to establish a nuclear power plant now would, more likely than not, face no opposition any more. In the changed circumstances the chances of clinching a deal with foreign suppliers for the establishment Chashma nuclear power plant without having to sign the non-proliferation treaty (NPT) have brightened according to independent observers. Pakistan is said to have already received a number of offers in response to its tenders for the Chashma nuclear power plant issued about three years back. The most attractive of these offers are said to have come from Belgium and West Germany. Meanwhile France is reported to have offered a power plant as compensation for going back on the reprocessing plant agreement. According to informed sources, these offers are now said to be under consideration of the government. The one hitch in accepting the French offer is said to be the unhappy experience with this country over the reprocessing deal. [Text] [Karachi DAWN in English 12 Mar 86 p 1 GF] /9274

CSO: 5100/4738

SOUTH AFRICA

NUCLEAR RESEARCH FACILITY TO BE ESTABLISHED

MB251521 Johannesburg SAPA in English 1500 GMT 25 Mar 86

[Text] House of Assembly, Mar 25, SAPA — A proposed nuclear research facility to be established at the Gouritz River mouth between Mossel Bay and Port Elizabeth would be open to inspection by the International Atomic Energy Agency [IAEA] if IAEA guarantees were required, the minister of mineral and energy affairs, Mr Danie Steyn, said today.

Answering a question by Mr Roger Hulley (PFP [Progressive Federal Party] Constantia), Mr Steyn said no final decision had been taken on what sort of facility would be erected. Financial circumstances had delayed the project and at present only the infrastructure was being provided.

If the activities to be conducted at the facility were of such a nature that it required IAEA guarantees, the centre would be open to inspection by the agency.

Mr Steyn said an environmental impact assessment of the project had been carried out and studies were continuing in cooperation with consultants and universities. The results would be made available to the public when the studies were completed.

/9365
CSO: 5100/19

USSR

ISRAELI NUCLEAR PROGRAM, AMERICAN SUPPORT ASSAILED

Moscow GOLOS RODINY in Russian No 7, Feb 86 p 13

[Article by M. Puchkovskiy: "Israel and the bomb"]

[Text] Officially there are five states of the world which possess nuclear weapons: the Soviet Union, the U.S., the PRC, Great Britain and France. But there are zealous pretenders to the title of "nuclear" countries. These are Israel, the Republic of South Africa [RSA] and Pakistan. Despite all the differences between these states a common political denominator is clearly observed: they enjoy the protection of the U.S. which in relations with Israel and Pakistan is evident in openly military, economic and political support. They carry out a policy of state terrorism, using force or constantly threatening its use on their neighbors; they follow their own aims but at the same time are ready to fulfill the role of U.S. mercenaries in their own regions.

These circumstances make the nuclear ambitions of the Zionists, the Pakistani military establishment and the racists of South Africa particularly dangerous.

In November of 1984 Georgetown University published the results of its research on Israel's nuclear arsenal. According to this data, Tel Aviv today has at its disposal from 50 to 100 nuclear bombs. According to other American sources, the nuclear strike force of Israel is comparable to the nuclear capability of Great Britain at the end of the 70's.

How was this able to happen?

Each state, particularly a country with aggressive aspirations, and namely such a country as Israel, produces its own weapons under a cover of deep secrecy. But murder will out, particularly when such a "secret" is a nuclear bomb. Separate pieces of information testify to how the Israeli nuclear tumor grew.

In the 1950's, Chaim Weizman, a world-renowned chemist, convinced then Israeli prime minister Ben-Gurion that Israel was "an island in a sea of Arabs" and that nuclear weapons were necessary in order to subordinate this "sea". The first help was received from France, which had just started creating its own "independent nuclear forces". The French needed to carry out a number of complicated calculations, but the U.S. refused

to sell them computers. Then Tel Aviv promised to carry out the necessary calculations on the newest American-made computers, which the Weizman Institute had. In exchange an experimental nuclear reactor for the production of plutonium was received from the French. The French firm Saint-Gobens Technique Nouvelle installed it at the Israeli nuclear center in the Negev desert.

With the accession to power in France of General de Gaulle this cooperation came to an end but a secret supply of uranium to Israel had already been arranged. In December 1968 Europe was struck by a mysterious disappearance of 299 tons of uranium ore from the ship "Sheysberg". The secret services of several West European countries established that this "pickpocket theft" involved the Israeli intelligence service Mossad.

This amount of raw material was enough for 130-150 kilograms of plutonium but the military men in Tel Aviv did not want to wait. The next loss of a certain amount of pure plutonium now occurred in the U.S. tracks led to Israel but President Johnson ordered the CIA director to stop the investigation.

Thus at the end of the 1960's Israel had everything necessary for production of first generation nuclear weapons. Now its concern is for keeping its monopoly in the Middle East. On 7 June 1981 Israel aircraft destroyed in a sudden strike an Iraqi nuclear reactor in Baghdad, received by Iraq also from France. Two years earlier in Marseilles Israeli saboteurs blew up the components parts of a nuclear reactor which the French were preparing for shipment to Iraq.

For testing the activity of "production" Israeli experts were permitted to observe French experimental explosions in the Sahara. In addition, the explosion in South Africa, which was detected by an American satellite in September 1979, according to information of specialists, was an explosion of an Israeli nuclear bomb.

Thanks to its close contacts with a group of American theorteticisans and technologists in nuclear physics, Israel achieved further improvement in its nuclear weapons. In the U.S. they make no big secret of the pro-Zionist sentiments of "the father of the atom bomb" Edward Teller and several young scientists who in the last 15 years have been connected with Israel by a multitude of open and secret ties.

Israel's dependence on military and economic aid of the U.S. increases in proportion to its ambitions in the Middle East. Its military self-confidence as possessor of an atom bomb strengthens its foreign policy adventurism and the threat of its role as "detonator" country and its readiness to follow the dangerous course of the United States.

That is why Israel declines with such constancy the peaceful initiatives of the Soviet Union. That is why it was one of the first who supported the American plan of "star wars" and expressed readiness to participate in every possible way (although, of course, not selflessly) in joint development of space weapons.

CSO: 5100/12

NEW NUCLEAR PLANTS PLANNED

The Hague ANP NEWS BULLETIN in English 3 Mar 86 p 6

[Text] The Hague, March 3--Economics Minister Fijs van Aardenne has poured cold water on a report which says the Netherlands could save billions of guilders by dropping plans to build two new nuclear power plants.

The report, published on Saturday by Groningen University researchers, said that in the year 2000 it would cost up to 800 million guilders less to meet the nation's electricity needs if the plants are not built.

The researchers assumed an oil price in the year 2000 of 22 U.S. dollars per barrel and an exchange rate for the dollar of 2.75 guilders.

The report was commissioned by a Dutch environmental group which opposes the expansion of Dutch nuclear power capacity.

Commenting on the report in a Dutch radio interview on Saturday, Van Aardenne said the assumption that oil prices would remain low was too optimistic.

Labour Opposition

He said he stood by government plans to have two new nuclear power plants in operation by 1995 and that the Netherlands should aim in the long term to generate 40 percent of its electricity in such plants.

The government decided in January 1985 that at least two new nuclear power plants, each with a capacity of between 900 and 1,300 megawatts, should be built by the year 2000.

The main opposition Labour party opposes expansion of nuclear generating capacity and wants the existing small nuclear plants of 450 MW at Borssele and 50 MW at Dodewaard to close.

The two plants currently supply some six percent of the electricity generated in the Netherlands.

/9274
CSO: 5100/2517

END

END OF FICHE

DATE FILMED

12 MAY 86